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CALCULATED
PRESSURE-BROADENED
LINEWIDTHS OF C^2H_4

G. D. T. Tejwani
and
E. S. Yeung

AMES LABORATORY, DOE
IOWA STATE UNIVERSITY
AMES, IOWA

Date Transmitted: April 1978

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G. D. T. Tejwani and E. S. Yeung

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ABSTRACT

Self-broadened and foreign-gas (N_2 and O_2) broadened linewidths of ethylene at 300K for a wide range of quantum numbers J and K_a , for all three types of bands, have been calculated using the Anderson-Tsao-Curnutte theory of line broadening. C_2H_4 has a zero value of the dipole moment in its ground state. Therefore, only the quadrupolar interactions were considered in the linewidth computations. The molecular quadrupole moment tensor of C_2H_4 was taken from Mulder and Huiszoon. Air-broadened linewidths of C_2H_4 at 200K have also been calculated, so that the temperature dependence can be estimated.

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I. INTRODUCTION

C_2H_4 is one of the pollutant gases in automobile effluents.¹ Various laser techniques and instrumentation have been developed for the purpose of detection and monitoring of this as well as several other pollutants in the atmosphere.¹⁻⁸ However, in the case of ethylene, there is a lack of data on spectral line parameters. In particular, there are no linewidth values available in the literature for this gas. Absorption coefficients have been measured at a few frequencies.⁹⁻¹¹ To calculate the absorption coefficient at any other frequency, line strength and linewidth data are needed. In this work, we have calculated self- and foreign-gas-broadened linewidths for C_2H_4 transitions by using the line-broadening theory of the asymmetric top molecules developed by Yamamoto and Aoki¹² in the framework of Anderson-Tsao-Curnutte's theory.¹³⁻¹⁴

The linewidth computations have been performed for C_2H_4 transitions in all three types of bands. N_2 - and O_2 -broadened linewidths were calculated for all the transitions, with $J \leq 20$ and $K_a \leq 10$ at 200 and 300K. Self-broadened linewidth computations were limited to $J \leq 5$ at 300K. The energy level of the lower state for each transition, along with approximate values for the line position and the relative line intensity have been calculated for the strongest fundamental in each band type.¹⁵ These bands are ν_{11} in type A, ν_9 in type B, and ν_7 in type C.

II. COMPUTATIONAL PROCEDURE

The ethylene molecule has a plane symmetrical form (point group V_h). It has no permanent dipole moment in its ground state. Therefore, the quadrupolar interaction will be the most dominant in the line broadening calculations under this study. We have considered only the quadrupole-quadrupole interaction in C_2H_4 self-, N_2 -, and O_2 - broadening computations. Higher order interactions have been neglected in this work. In view of fairly large quadrupole moment of C_2H_4 ,¹⁶ the contribution to the linewidth due to higher order multipole interactions should be insignificant.

The details of computer programs are given in Ref. 17. To save the computer time, dipolar interaction terms and subroutines were taken out of the computer programs. For C_2H_4 linewidth calculation, the contribution to γ^0 through $S_2(b)$ from quadrupole transition probability terms for $|\Delta K_a|$ and $|\Delta K_c| \leq 4$ need to be taken into account.¹⁷ For the perturbing molecule in self-broadening, rotational levels with $J \leq 25$ and $K_a \leq 10$ were taken into account. This range of quantum numbers covers 92.4% of the population in the Boltzmann distribution for the ground vibrational state at 300K. The pertinent data¹⁷ for these rotational levels (total number being 436) were put on a disk.

Rotational and centrifugal distortion constants, in the ground state of C_2H_4 have been taken from Ref. 18. Small differences in the rotational and centrifugal distortion constants

between the ground and upper states of C_2H_4 in the linewidth computations of vibration-rotation bands have been neglected. The ground state rotational and centrifugal distortion constants for nitrogen and oxygen were obtained from the pure rotational Raman spectra of these gases.¹⁹ Kinetic theory collision diameters were taken from Svehla.²⁰ The quadrupole moments of N_2 and O_2 have been taken from the induced birefringence measurements of Buckingham et al.²¹ The quadrupole moment tensor components of ethylene molecule have been calculated by Mulder and Huiszoon¹⁶ from molecular LCAO-SCF wave functions. Experimental measurements in the case of the quadrupole moment of C_2H_4 are available only for the z component.²² This value²² for θ_{zz} is in excellent agreement with the calculations of Mulder and Huiszoon¹⁶ for ethylene molecule. We have used the quadrupole moment values for C_2H_4 given in Ref. 16 in our linewidth computations.

In C_2H_4 , only five fundamental modes are infrared active.¹⁵ Out of these ν_7 band is of type C, ν_9 and ν_{10} are of type B, and ν_{11} and ν_{12} are type A bands. We have performed linewidth calculations for all three types of bands. Approximate values for line positions and relative line intensities have been calculated for ν_{11} , ν_9 , and ν_7 fundamentals among the type A, type B, and type C bands, respectively. The band centers have been taken from Ref. 18. Linewidth results in this report are very general and should be applicable to all the bands of a particular band type.

III. RESULTS AND DISCUSSION

N_2 - and O_2 - broadened linewidths of ethylene at 300K for about 500 transitions in type A and type C bands and for about 800 transitions in type B band have been computed. These transitions are in the range of $0 \leq J \leq 20$ and $0 \leq K_a \leq 10$, with the restriction that ΔK_a and $\Delta K_c \leq 1$. Self-broadened linewidths at 300K have been calculated for transitions with $J \leq 5$. These results along with air-broadened values at 200K are given in Appendices A, B, and C for bands of type A, type B, and type C, respectively. As can be seen, linewidths show fairly strong dependence with respect to the quantum numbers.

Weighted mean linewidths of C_2H_4 broadened by N_2 , O_2 , air, and C_2H_4 at 300K and by N_2 , O_2 , and air at 200K for all three types of bands are given in Table 1. Averaging has been performed over all the transitions in Appendices A, B, and C, for type A, type B, and type C bands, respectively. Obviously for the self-broadening, the averaging is limited to transitions with $J \leq 5$. Weighting has been done with respect to the relative intensity of the transition. The temperature dependence of linewidths can be obtained by the use of Eqs. (8) and (9) of Ref. 23.

Rotational energy level of the lower state for each transition along with its approximate line position and relative intensity have also been tabulated in Appendices. Line position and relative intensity data in Appendices A, B, and C refer to ν_{11} , ν_9 , and ν_7 fundamentals, respectively.

Table 1. Intensity weighted average linewidths of C_2H_4 . Units of linewidth are $cm^{-1} atm^{-1}$.

Band type	Broadener	Average linewidth	
		at 300K	at 200K
A	N_2	0.0841	0.1089
	O_2	0.0483	0.0623
	Air	0.0766	0.0992
	C_2H_4	0.1588	
B	N_2	0.0756	0.1003
	O_2	0.0452	0.0587
	Air	0.0693	0.0916
	C_2H_4	0.1610	
C	N_2	0.0755	0.1002
	O_2	0.0452	0.0586
	Air	0.0692	0.0915
	C_2H_4	0.1612	

ν_9 and ν_{11} bands of C_2H_4 are mainly free from overlapping with normal telluric features in 1 to 5μ region. Therefore these bands should be well suited for studies involving low to moderately high resolution. Most of the laser studies on C_2H_4 have been made in the ν_7 band region.^{5-7,9} This is due to the fact that there are several $^{12}C^{16}O_2$ laser wavelengths within the spectral absorption region of this band.

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V. APPENDIX A

LISTING OF LINEWIDTHS FOR TYPE A BAND

Linewidths and other spectral parameters for transitions in a type A band of C_2H_4 are listed in this Appendix. First three columns in the tabulation refer to the lower state quantum numbers J , K_a , and K_c , respectively; while column numbers 4 to 6 give these quantum numbers for the upper state of the transition. Column number 7 shows the line position in cm^{-1} for the transition in the ν_{11} fundamental of ethylene. Rotational energy level in cm^{-1} for the lower state is given in column 8 and the relative line intensity for the transition in ν_{11} band is shown in column 9. Next four columns, i.e., columns 10 through 13, list self-, N_2 -, O_2 -, and air-broadened linewidths of C_2H_4 given in the units of $10^{-4} cm^{-1} atm^{-1}$. $\gamma^0 C_2H_4$ -air is at 200K, all other linewidth values reported here are at 300K. All the linewidth results in this Appendix should be applicable to any type A band. Lower and upper states are interchangeable as far as linewidth values are concerned.

Listing of Linewidth Parameters for Type A Band of C_2H_4

Lower State			Upper State			Approximate Line Position in the ν_{11} Band (cm^{-1})	Rotational Energy of the Lower State (cm^{-1})	Relative Line Intensity (ν_{11} Band) at 300°K	γ^0 ($\ln 10^{-4} cm^{-1} atm^{-1}$) of C_2H_4 Lines Broadened by			
J	K_a	K_c	J	K_a	K_c				C_2H_4	N_2	O_2	Air
									300°K	300°K	200°K	
0	0	0	1	0	1	2990.5	0.0	1.00	1632	816	471	1006
1	1	1	1	1	0	2988.8	5.69	1.46	1630	826	475	1018
1	1	1	2	1	2	2992.1	5.69	1.46	1634	830	476	1023
2	0	2	1	0	1	2985.0	5.48	1.95	1638	785	458	971
2	0	2	3	0	3	2994.1	5.48	2.92	1631	789	457	971
2	1	1	1	1	0	2984.8	9.70	1.43	1631	832	476	1023
2	1	1	2	1	2	2989.1	9.70	0.80	1635	820	471	1010
2	1	1	3	1	2	2994.4	9.70	2.55	1625	816	468	1002
2	2	0	2	2	1	2988.6	21.30	3.01	1627	790	461	975
2	2	0	3	2	1	2994.2	21.30	1.51	1627	825	473	1013
3	1	3	2	1	2	2983.4	14.41	2.48	1634	813	467	1001
3	1	3	3	1	2	2989.7	14.41	0.54	1623	814	467	998
3	1	3	4	1	4	2995.5	14.41	3.51	1619	808	465	988
3	2	2	2	2	1	2983.2	26.78	1.46	1628	824	473	1012
3	2	2	3	2	1	2988.7	26.78	2.05	1628	830	475	1018
3	2	2	4	2	3	2996.0	26.78	2.64	1617	831	475	1016
3	3	1	3	3	0	2988.6	46.53	4.20	1623	755	447	931
3	3	1	4	3	2	2996.0	46.53	1.40	1626	806	466	990
4	0	4	3	0	3	2981.4	18.21	3.65	1569	760	447	932
4	0	4	5	0	5	2997.7	18.21	4.58	1518	746	443	904
4	1	3	3	1	2	2981.0	23.10	3.35	1604	810	466	984
4	1	3	4	1	4	2986.9	23.10	0.40	1599	811	466	981
4	1	3	5	1	4	2998.2	23.10	4.31	1515	754	445	919
4	2	2	3	2	1	2981.3	34.18	2.54	1615	831	475	1014
4	2	2	4	2	3	2988.6	34.18	1.52	1604	825	472	1004
4	2	2	5	2	3	2997.9	34.18	3.58	1587	821	471	994
4	3	1	3	3	0	2981.3	53.86	1.35	1626	806	466	990
4	3	1	4	3	2	2988.6	53.86	3.13	1628	827	474	1013
4	3	1	5	3	2	2997.8	53.86	2.48	1605	824	472	1009
4	4	0	4	4	1	2988.6	81.49	4.87	1621	727	437	894

4	4	0	5	4	1	2997.8	81.49	1.22	1625	787	458	967
5	1	5	4	1	4	2980.0	30.06	4.14	1527	752	444	922
5	1	5	5	1	4	2991.2	30.06	0.32	1425	684	426	843
5	1	5	6	1	6	2999.1	30.06	5.06	1415	678	425	832
5	2	4	4	2	3	2979.5	43.23	3.40	1590	822	472	996
5	2	4	5	2	3	2988.8	43.23	1.18	1573	817	470	985
5	2	4	6	2	5	2999.6	43.23	4.35	1501	774	452	938
5	3	3	4	3	2	2979.5	63.03	2.36	1605	824	472	1009
5	3	3	5	3	2	2988.7	63.03	2.44	1580	812	467	994
5	3	3	6	3	4	2999.7	63.03	3.34	1548	806	466	980
5	4	2	4	4	1	2979.5	90.65	1.16	1625	787	458	967
5	4	2	5	4	1	2988.6	90.65	3.80	1629	818	469	1003
5	4	2	5	4	3	2999.6	90.65	2.17	1600	815	468	1001
5	5	1	5	5	0	2988.6	126.16	5.00	1619	703	430	867
5	5	1	6	5	2	2999.6	126.16	1.00	1621	770	451	948
6	0	6	5	0	5	2977.9	38.03	4.96		767	450	916
6	0	6	7	0	7	3001.2	38.03	5.83		670	421	789
6	1	5	5	1	4	2977.2	44.10	4.70		690	428	838
6	1	5	5	1	6	2985.0	44.10	0.25		688	427	833
6	1	5	7	1	6	3002.0	44.10	5.57		856	491	1035
6	2	4	5	2	3	2977.5	54.57	4.09		776	453	940
6	2	4	6	2	5	2988.3	54.57	0.93		726	436	883
6	2	4	7	2	5	3001.7	54.57	4.97		707	431	855
6	3	3	5	3	2	2977.6	74.04	3.14		806	466	980
6	3	3	6	3	4	2988.6	74.04	1.95		796	463	962
6	3	3	7	3	4	3001.5	74.04	4.02		815	472	978
6	4	2	5	4	1	2977.7	101.65	2.04		815	468	1001
6	4	2	6	4	3	2988.6	101.65	3.04		803	463	989
6	4	2	7	4	3	3001.5	101.65	2.91		779	456	954
6	5	1	5	5	0	2977.7	137.15	0.95		770	451	948
6	5	1	6	5	2	2988.6	137.15	4.01		807	465	990
6	5	1	7	5	2	3001.5	137.15	1.78		812	466	995
6	6	0	6	6	1	2988.6	180.53	4.69		716	429	848
6	6	0	7	6	1	3001.5	180.53	0.78		775	448	929
7	1	7	5	1	6	2976.5	52.61	5.30		857	492	1036
7	1	7	7	1	6	2993.5	52.61	0.21		734	440	872
7	1	7	8	1	8	3002.5	52.61	6.14		723	436	865
7	2	6	6	2	5	2975.9	66.94	4.64		704	431	851
7	2	6	7	2	5	2989.3	66.94	0.75		679	426	819
7	2	6	8	2	7	3003.2	66.94	5.46		883	505	1072
7	3	5	6	3	4	2975.8	86.88	3.75		811	470	978
7	3	5	7	3	4	2988.7	86.88	1.58		802	467	959
7	3	5	8	3	6	3003.3	86.88	4.55		768	454	924
7	4	4	6	4	3	2975.8	114.48	2.71		779	456	954
7	4	4	7	4	3	2988.7	114.48	2.47		751	446	911
7	4	4	8	4	5	3003.3	114.48	3.48		844	490	1026
7	5	3	6	5	2	2975.8	149.97	1.66		812	466	995
7	5	3	7	5	2	2988.6	149.97	3.26		809	464	991
7	5	3	8	5	4	3003.3	149.97	2.39		769	451	942
7	6	2	6	6	1	2975.8	193.35	0.73		768	447	929
7	6	2	7	6	1	2988.6	193.35	3.81		804	460	974
7	6	2	8	6	3	3003.3	193.35	1.39		816	464	984
7	7	1	7	7	0	2988.6	244.58	4.06		700	424	828
7	7	1	8	7	2	3003.3	244.58	0.58		758	441	906

8	0	3	7	0	7	2974.4	64.74	5.80	897	508	1074
8	0	3	9	0	9	3004.5	64.74	6.59	851	487	1019
8	1	7	7	1	6	2973.5	72.63	5.52	739	441	884
8	1	7	8	1	8	2982.5	72.63	0.17	688	426	831
8	1	7	9	1	8	3005.7	72.63	6.30	845	483	993
8	2	6	7	2	5	2973.7	82.63	5.02	923	524	1118
8	2	6	8	2	7	2997.5	82.63	0.60	873	499	1056
8	2	6	9	2	7	3005.6	82.63	5.79	871	498	1049
8	3	5	7	3	4	2973.9	101.62	4.20	773	456	926
8	3	5	8	3	6	2988.6	101.62	1.29	696	430	836
8	3	5	9	3	6	3005.2	101.62	4.94	919	526	1099
9	4	4	7	4	3	2974.0	129.15	3.21	866	499	1055
9	4	4	8	4	5	2998.6	129.15	2.03	861	504	1048
9	4	4	9	4	5	3005.2	129.15	3.91	844	491	1026
9	5	3	7	5	2	2974.0	164.63	2.20	769	451	941
9	5	3	8	5	4	2988.6	164.63	2.68	719	436	877
9	5	3	9	5	4	3005.1	164.63	2.84	890	503	1059
9	6	2	7	6	1	2974.0	208.00	1.28	813	464	984
9	6	2	8	6	3	2988.6	208.00	3.13	819	465	987
9	6	2	9	6	3	3005.1	208.00	1.85	770	449	933
9	7	1	7	7	0	2974.0	252.23	0.54	756	441	905
9	7	1	8	7	2	2988.6	252.23	3.34	788	454	951
9	7	1	9	7	2	3005.1	252.23	1.03	806	460	965
9	8	0	8	8	1	2988.6	318.30	3.28	670	418	806
9	8	0	9	8	1	3005.1	318.30	0.41	729	434	878
9	1	9	8	1	8	2973.1	82.00	5.96	816	470	956
9	1	9	9	1	8	2996.3	82.00	0.15	882	509	1023
9	1	9	10	1	10	3005.9	82.00	6.71	851	489	984
9	2	8	8	2	7	2972.3	97.87	5.32	802	470	968
9	2	8	9	2	7	2990.4	97.87	0.49	788	463	945
9	2	8	10	2	9	3006.8	97.87	6.03	834	480	986
9	3	7	8	3	6	2972.1	118.09	4.52	909	521	1097
9	3	7	9	3	6	2988.8	118.09	1.06	928	536	1108
9	3	7	10	3	8	3007.0	118.09	5.20	879	510	1058
9	4	6	8	4	5	2972.1	145.66	3.57	818	479	994
9	4	6	9	4	5	2988.7	145.66	1.67	744	444	902
9	4	6	10	4	7	3007.0	145.66	4.20	891	511	1072
9	5	5	8	5	4	2972.2	181.12	2.60	887	502	1069
9	5	5	9	5	4	2988.6	181.12	2.21	917	520	1082
9	5	5	10	5	6	3007.0	181.12	3.17	878	496	1044
9	6	4	8	6	3	2972.2	224.48	1.69	771	450	934
9	6	4	9	6	3	2988.6	224.48	2.59	708	432	858
9	6	4	10	6	5	3007.0	224.48	2.19	877	489	1028
9	7	3	8	7	2	2972.2	275.70	0.94	806	460	966
9	7	3	9	7	2	2988.6	275.70	2.76	819	464	976
9	7	3	10	7	4	3007.0	275.70	1.37	770	448	923
9	8	2	8	8	1	2972.2	334.77	0.38	729	434	878
9	8	2	9	8	1	2988.6	334.77	2.71	763	446	921
9	8	2	10	8	3	3006.9	334.77	0.73	789	453	938
9	9	1	9	9	0	2988.6	401.67	2.49	651	415	788
9	9	1	10	9	2	3006.9	401.67	0.28	706	428	848
10	0	10	9	0	9	2971.1	98.15	6.17	875	493	1027
10	0	10	11	0	11	3007.8	98.15	6.87	894	500	1037
10	1	9	9	1	8	2969.8	108.56	5.83	873	501	1023

10	1	9	10	1	10	2979.3	108.56	0.12	832	472	972
10	1	9	11	1	10	3009.3	108.56	6.50	879	503	1027
10	2	8	9	2	7	2959.7	118.48	5.41	903	513	1067
10	2	8	10	2	9	2986.2	118.48	0.39	920	523	1078
10	2	8	11	2	9	3009.5	118.48	6.07	925	528	1084
10	3	7	9	3	6	2970.2	136.66	4.70	895	516	1065
10	3	7	10	3	8	2988.5	136.66	0.87	829	487	997
10	3	7	11	3	8	3009.0	136.66	5.32	904	520	1069
10	4	6	9	4	5	2970.3	164.02	3.80	918	525	1108
10	4	6	10	4	7	2988.6	164.02	1.38	948	546	1138
10	4	6	11	4	7	3008.9	164.02	4.38	927	533	1115
10	5	5	9	5	4	2970.3	199.46	2.86	880	491	1036
10	5	5	10	5	6	2988.6	199.46	1.83	809	458	955
10	5	5	11	5	6	3008.8	199.46	3.38	914	508	1064
10	6	4	9	6	3	2970.3	242.79	1.00	884	483	1020
10	6	4	10	6	5	2988.6	242.79	2.14	908	490	1017
10	6	4	11	6	5	3008.8	242.79	2.43	875	471	978
10	7	3	9	7	2	2970.3	294.01	1.24	769	448	923
10	7	3	10	7	4	2988.6	294.01	2.28	701	430	847
10	7	3	11	7	4	3008.8	294.01	1.61	843	466	974
10	8	2	9	8	1	2970.4	353.07	0.66	789	453	938
10	8	2	10	8	3	2988.6	353.07	2.25	809	460	954
10	8	2	11	8	3	3008.8	353.07	0.96	763	445	905
10	9	1	9	9	0	2970.4	419.96	0.25	706	428	848
10	9	1	10	9	2	2988.6	419.96	2.06	736	438	884
10	9	1	11	9	2	3008.8	419.96	0.49	766	445	902
10	10	0	10	10	1	2988.6	494.66	1.78	641	413	765
10	10	0	11	10	1	3008.8	494.66	0.18	684	423	815
11	1	11	10	1	10	2959.7	118.17	6.14	847	480	978
11	1	11	11	1	10	2999.7	118.17	0.11	881	506	1018
11	1	11	12	1	12	3009.3	118.17	6.80	848	481	975
11	2	10	10	2	9	2968.7	135.94	5.50	854	486	996
11	2	10	11	2	9	2992.1	135.94	0.32	857	489	995
11	2	10	12	2	11	3010.3	135.94	6.11	847	482	986
11	3	9	10	3	8	2968.4	156.69	4.77	883	511	1055
11	3	9	11	3	8	2989.0	156.69	0.71	936	539	1105
11	3	9	12	3	10	3010.7	156.69	5.34	892	514	1059
11	4	8	10	4	7	2968.4	184.22	3.92	896	514	1073
11	4	8	11	4	7	2988.7	184.22	1.14	862	498	1030
11	4	8	12	4	9	3010.7	184.22	4.44	896	513	1071
11	5	7	10	5	6	2968.5	219.63	3.02	909	511	1067
11	5	7	11	5	6	2988.7	219.63	1.51	962	537	1112
11	5	7	12	5	8	3010.7	219.63	3.48	924	518	1074
11	6	6	10	6	5	2968.5	262.95	2.17	863	475	985
11	6	6	11	6	5	2988.6	262.95	1.77	807	450	916
11	6	6	12	6	7	3010.6	262.95	2.57	877	482	991
11	7	5	10	7	4	2968.5	314.15	1.44	843	468	977
11	7	5	11	7	4	2988.6	314.15	1.89	849	465	941
11	7	5	12	7	6	3010.6	314.15	1.77	817	454	914
11	8	4	10	8	3	2968.5	373.20	0.86	763	445	905
11	8	4	11	8	3	2988.6	373.20	1.86	693	427	830
11	8	4	12	8	5	3010.6	373.20	1.12	802	453	924
11	9	3	10	9	2	2968.5	440.08	0.44	766	445	902
11	9	3	11	9	2	2988.6	440.08	1.71	791	452	919

11	9	3	12	9	4	3010.6	440.08	0.64	749	440	878
11	10	2	10	10	1	2968.5	514.77	0.16	684	423	815
11	10	2	11	10	1	2989.6	514.77	1.48	707	430	844
11	10	2	12	10	3	3010.6	514.77	0.31	736	436	859
12	0	12	11	0	11	2967.8	138.13	6.10	889	500	1026
12	0	12	13	0	13	3011.1	138.13	6.71	888	501	1019
12	1	11	11	1	10	2966.2	151.72	5.69	881	504	1025
12	1	11	12	1	12	2975.7	151.72	0.09	842	475	975
12	1	11	13	1	12	3012.9	151.72	6.26	882	504	1023
12	2	10	11	2	9	2965.8	162.16	5.32	921	529	1075
12	2	10	12	2	11	2984.1	162.16	0.25	909	520	1061
12	2	10	13	2	11	3013.4	162.16	5.89	921	530	1075
12	3	9	11	3	8	2966.4	179.29	4.72	914	525	1074
12	3	9	12	3	10	2988.1	179.29	0.58	861	498	1017
12	3	9	13	3	10	3012.9	179.29	5.25	912	524	1070
12	4	8	11	4	7	2966.6	206.31	3.94	930	534	1115
12	4	8	12	4	9	2988.6	206.31	0.94	949	545	1134
12	4	8	13	4	9	3012.6	206.31	4.41	935	537	1117
12	5	7	11	5	6	2966.6	241.65	3.09	929	517	1073
12	5	7	12	5	8	2988.6	241.65	1.25	881	493	1018
12	5	7	13	5	8	3012.5	241.65	3.50	927	517	1071
12	6	6	11	6	5	2966.7	284.94	2.28	887	480	985
12	6	6	12	6	7	2988.6	284.94	1.47	926	502	1021
12	6	6	13	6	7	3012.5	284.94	2.63	897	486	986
12	7	5	11	7	4	2966.7	336.12	1.57	817	452	912
12	7	5	12	7	6	2988.6	336.12	1.56	767	437	861
12	7	5	13	7	6	3012.5	336.12	1.86	824	456	911
12	8	4	11	8	3	2966.7	395.16	0.99	802	453	924
12	8	4	12	8	5	2988.6	395.16	1.54	789	446	867
12	8	4	13	8	5	3012.4	395.16	1.22	765	437	847
12	9	3	11	9	2	2966.7	462.03	0.57	749	440	878
12	9	3	12	9	4	2988.6	462.03	1.42	682	424	810
12	9	3	13	9	4	3012.4	462.03	0.74	763	441	877
12	10	2	11	10	1	2966.7	536.71	0.28	736	436	859
12	10	2	12	10	3	2988.6	536.71	1.22	760	442	875
12	10	2	13	10	3	3012.4	536.71	0.41	726	433	843
13	1	13	12	1	12	2966.4	161.07	5.91	841	476	969
13	1	13	13	1	12	3003.5	161.07	0.08	875	500	1009
13	1	13	14	1	14	3012.6	161.07	6.47	836	475	963
13	2	12	12	2	11	2965.2	181.09	5.27	845	479	982
13	2	12	13	2	11	2994.5	181.09	0.20	860	492	997
13	2	12	14	2	13	3013.9	181.09	5.79	839	476	976
13	3	11	12	3	10	2964.8	202.64	4.62	887	512	1053
13	3	11	13	3	10	2989.5	202.64	0.47	929	535	1097
13	3	11	14	3	12	3014.4	202.64	5.10	886	512	1053
13	4	10	12	4	9	2964.7	230.19	3.87	897	513	1068
13	4	10	13	4	9	2988.7	230.19	0.77	876	502	1043
13	4	10	14	4	11	3014.4	230.19	4.30	893	511	1065
13	5	9	12	5	8	2964.8	265.51	3.08	921	517	1068
13	5	9	13	5	8	2988.7	265.51	1.03	957	535	1103
13	5	9	14	5	10	3014.4	265.51	3.45	920	516	1064
13	6	8	12	6	7	2964.8	308.77	2.31	886	488	991
13	6	8	13	6	7	2988.6	308.77	1.21	847	469	941
13	6	8	14	6	9	3014.3	308.77	2.62	883	487	986

13	7	7	12	7	6	2964.8	359.93	1.63	824	457	913
13	7	7	13	7	6	2988.6	359.93	1.29	854	470	932
13	7	7	14	7	8	3014.3	359.93	1.88	827	460	908
13	8	6	12	8	5	2964.9	418.95	1.07	765	438	848
13	8	6	13	8	5	2988.6	418.95	1.27	723	427	806
13	8	6	14	8	7	3014.3	418.95	1.28	765	439	843
13	9	5	12	9	4	2964.9	485.81	0.65	763	441	877
13	9	5	13	9	4	2988.6	485.81	1.17	735	431	806
13	9	5	14	9	6	3014.3	485.81	0.81	719	426	793
13	10	4	12	10	3	2964.9	560.47	0.36	726	433	843
13	10	4	13	10	3	2988.6	560.47	1.01	664	420	782
13	10	4	14	10	5	3014.2	560.47	0.47	723	430	827
14	0	14	13	0	13	2964.6	184.67	5.69	877	497	1005
14	0	14	15	0	15	3014.4	184.67	6.20	872	495	997
14	1	13	13	1	12	2962.7	201.90	5.21	881	503	1022
14	1	13	14	1	14	2971.8	201.90	0.07	840	475	973
14	1	13	15	1	14	3016.3	201.90	5.68	879	502	1019
14	2	12	13	2	11	2952.0	213.60	4.88	914	530	1065
14	2	12	14	2	13	2981.3	213.60	0.16	897	517	1047
14	2	12	15	2	13	3017.2	213.60	5.34	912	529	1068
14	3	11	13	3	10	2962.5	229.66	4.40	912	526	1069
14	3	11	14	3	12	2987.4	229.66	0.38	865	500	1018
14	3	11	15	3	12	3016.8	229.66	4.83	909	525	1064
14	4	10	13	4	9	2962.8	256.04	3.73	935	537	1115
14	4	10	14	4	11	2988.6	256.04	0.63	945	542	1130
14	4	10	15	4	11	3016.3	256.04	4.12	936	538	1115
14	5	9	13	5	8	2962.9	291.23	3.00	927	517	1070
14	5	9	14	5	10	2988.6	291.23	0.85	883	495	1018
14	5	9	15	5	10	3016.2	291.23	3.33	926	517	1069
14	6	8	13	6	7	2963.0	334.45	2.28	894	486	982
14	6	8	14	6	9	2988.6	334.45	1.00	919	501	1010
14	6	8	15	6	9	3016.2	334.45	2.56	893	486	979
14	7	7	13	7	6	2963.0	385.58	1.64	828	459	906
14	7	7	14	7	8	2988.6	385.58	1.06	789	447	867
14	7	7	15	7	8	3016.1	385.58	1.86	825	458	901
14	8	6	13	8	5	2963.0	444.58	1.11	765	438	843
14	8	6	14	8	7	2988.6	444.58	1.05	785	447	853
14	8	6	15	8	7	3016.1	444.58	1.28	765	439	836
14	9	5	13	9	4	2963.0	511.42	0.70	718	425	793
14	9	5	14	9	6	2988.6	511.42	0.96	682	418	755
14	9	5	15	9	6	3016.1	511.42	0.83	715	425	786
14	10	4	13	10	3	2963.1	586.07	0.41	723	430	827
14	10	4	14	10	5	2988.6	586.07	0.83	685	419	752
14	10	4	15	10	5	3016.1	586.07	0.51	672	416	745
15	1	15	14	1	14	2953.0	210.66	5.38	830	471	957
15	1	15	15	1	14	3007.5	210.66	0.06	868	495	999
15	1	15	16	1	16	3015.9	210.66	5.84	825	469	950
15	2	14	14	2	13	2961.7	233.23	4.76	837	474	972
15	2	14	15	2	13	2997.6	233.23	0.13	855	491	999
15	2	14	16	2	15	3017.3	233.23	5.18	832	471	965
15	3	13	14	3	12	2961.1	255.92	4.18	883	510	1051
15	3	13	15	3	12	2990.5	255.92	0.30	922	532	1091
15	3	13	16	3	14	3018.0	255.92	4.56	884	510	1052
15	4	12	14	4	11	2961.0	283.58	3.54	891	510	1062

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15	4	12	15	4	11	2988.8	283.58	0.51	878	503	1044
15	4	12	16	4	13	3018.1	283.58	3.89	885	507	1055
15	5	11	14	5	10	2961.1	318.79	2.86	917	514	1059
15	5	11	15	5	10	2988.7	318.79	0.69	953	533	1098
15	5	11	16	5	12	3018.1	318.79	3.16	916	513	1056
15	6	10	14	6	9	2961.1	361.96	2.20	880	487	982
15	6	10	15	6	9	2988.6	361.96	0.81	847	470	936
15	6	10	16	6	11	3018.0	361.96	2.45	877	485	979
15	7	9	14	7	8	2961.2	413.06	1.60	824	459	903
15	7	9	15	7	8	2988.6	413.06	0.87	846	468	919
15	7	9	16	7	10	3018.0	413.06	1.80	821	458	897
15	8	8	14	8	7	2961.2	472.04	1.11	765	440	836
15	8	8	15	8	7	2988.6	472.04	0.86	733	430	800
15	8	8	16	8	9	3017.9	472.04	1.26	762	439	831
15	9	7	14	9	6	2961.2	538.86	0.72	716	425	786
15	9	7	15	9	6	2988.6	538.86	0.79	726	429	786
15	9	7	16	9	8	3017.9	538.86	0.83	711	425	776
15	10	6	14	10	5	2961.2	613.50	0.44	672	416	745
15	10	6	15	10	5	2988.6	613.50	0.68	643	411	716
15	10	6	16	10	7	3017.9	613.50	0.52	667	415	737
16	0	16	15	0	15	2961.3	237.75	5.04	860	490	984
16	0	16	17	0	17	3017.7	237.75	5.46	853	488	977
16	1	15	15	1	14	2959.3	258.86	4.52	880	502	1017
16	1	15	16	1	16	2967.7	258.86	0.05	838	473	962
16	1	15	17	1	16	3019.6	258.86	4.90	874	499	1010
16	2	14	15	2	13	2958.2	272.64	4.22	906	528	1064
16	2	14	16	2	15	2977.9	272.64	0.10	886	513	1039
16	2	14	17	2	15	3021.0	272.64	4.58	903	528	1065
16	3	13	15	3	12	2958.5	287.90	3.84	909	525	1063
16	3	13	16	3	14	2986.0	287.90	0.24	868	501	1020
16	3	13	17	3	14	3020.8	287.90	4.19	904	524	1058
16	4	12	15	4	11	2959.1	313.30	3.31	936	537	1113
16	4	12	16	4	13	2988.4	313.30	0.41	940	538	1122
16	4	12	17	4	13	3020.1	313.30	3.61	938	538	1113
16	5	11	15	5	10	2959.2	348.21	2.69	926	518	1069
16	5	11	16	5	12	2988.6	348.21	0.56	885	496	1019
16	5	11	17	5	12	3019.9	348.21	2.95	926	518	1070
16	6	10	15	6	9	2959.3	391.32	2.08	891	486	978
16	6	10	16	6	11	2988.6	391.32	0.66	913	499	1006
16	6	10	17	6	11	3019.9	391.32	2.30	891	486	977
16	7	9	15	7	8	2959.3	442.39	1.54	822	457	895
16	7	9	16	7	10	2988.6	442.39	0.71	786	446	859
16	7	9	17	7	10	3019.8	442.39	1.71	819	457	892
16	8	8	15	8	7	2959.4	501.34	1.07	762	438	830
16	8	8	16	8	9	2988.6	501.34	0.70	776	444	840
16	8	8	17	8	9	3019.8	501.34	1.21	757	437	824
16	9	7	15	9	6	2959.4	568.14	0.71	711	425	776
16	9	7	16	9	8	2988.6	568.14	0.64	680	418	743
16	9	7	17	9	8	3019.8	568.14	0.81	706	424	772
16	10	6	15	10	5	2959.4	642.76	0.44	667	415	737
16	10	6	16	10	7	2988.6	642.76	0.56	673	417	729
16	10	6	17	10	7	3019.7	642.76	0.51	661	414	724
17	1	17	16	1	16	2959.7	266.90	4.65	819	464	943
17	1	17	17	1	16	3011.6	266.90	0.05	857	489	983

17	1	17	18	1	18	3019.3	266.90	5.03	813	462	934
17	2	16	16	2	15	2958.3	292.27	4.07	829	470	961
17	2	16	17	2	15	3001.3	292.27	0.09	851	489	1000
17	2	16	18	2	17	3020.7	292.27	4.41	825	467	957
17	3	15	16	3	14	2957.5	316.47	3.57	882	508	1050
17	3	15	17	3	14	2992.2	316.47	0.19	916	528	1085
17	3	15	18	3	16	3021.6	316.47	3.87	884	508	1051
17	4	14	16	4	13	2957.3	344.40	3.05	883	506	1055
17	4	14	17	4	13	2989.0	344.40	0.33	879	504	1044
17	4	14	18	4	15	3021.8	344.40	3.32	879	505	1050
17	5	13	16	5	12	2957.4	379.48	2.49	914	511	1053
17	5	13	17	5	12	2988.7	379.48	0.45	950	530	1095
17	5	13	18	5	14	3021.8	379.48	2.72	912	510	1050
17	6	12	16	6	11	2957.4	422.53	1.04	875	485	977
17	6	12	17	6	11	2988.7	422.53	0.54	847	470	936
17	6	12	18	6	13	3021.7	422.53	2.13	872	484	974
17	7	11	16	7	10	2957.5	473.56	1.44	818	458	895
17	7	11	17	7	10	2988.6	473.56	0.58	840	466	912
17	7	11	18	7	12	3021.7	473.56	1.59	816	457	891
17	8	10	15	8	9	2957.5	532.48	1.02	757	438	824
17	8	10	17	8	9	2988.6	532.48	0.57	727	429	791
17	8	10	18	8	11	3021.6	532.48	1.14	753	437	821
17	9	9	16	9	8	2957.5	599.25	0.68	706	424	772
17	9	9	17	9	8	2988.6	599.25	0.52	714	427	770
17	9	9	18	9	10	3021.6	599.25	0.77	699	423	763
17	10	8	16	10	7	2957.6	673.85	0.43	661	414	724
17	10	8	17	10	7	2988.6	673.85	0.45	634	410	699
17	10	8	18	10	9	3021.6	673.85	0.50	656	413	718
18	0	18	17	0	17	2958.0	297.40	4.26	844	482	967
18	0	18	18	0	19	3020.9	297.40	4.59	838	479	960
18	1	17	17	1	16	2956.1	322.39	3.74	872	499	1007
18	1	17	18	1	18	2963.8	322.39	0.04	832	471	960
18	1	17	19	1	18	3022.9	322.39	4.04	864	495	1000
18	2	16	17	2	15	2954.5	339.09	3.45	903	526	1066
18	2	16	18	2	17	2973.9	339.09	0.07	882	509	1037
18	2	16	19	2	17	3024.6	339.09	3.73	904	526	1068
18	3	15	17	3	14	2954.5	354.12	3.17	904	524	1059
18	3	15	18	3	16	2984.0	354.12	0.14	870	502	1025
18	3	15	19	3	16	3024.7	354.12	3.44	897	522	1053
18	4	14	17	4	13	2955.3	378.17	2.76	936	538	1111
18	4	14	18	4	15	2988.1	378.17	0.26	936	536	1114
18	4	14	19	4	15	3024.0	378.17	3.00	937	538	1110
18	5	13	17	5	12	2955.5	412.64	2.27	926	518	1072
18	5	13	18	5	14	2988.6	412.64	0.36	884	495	1021
18	5	13	19	5	14	3023.7	412.64	2.47	924	517	1073
18	6	12	17	6	11	2955.6	455.59	1.78	890	486	977
18	6	12	18	6	13	2988.6	455.59	0.43	909	498	1002
18	6	12	19	6	13	3023.6	455.59	1.95	890	487	978
18	7	11	17	7	10	2955.6	506.56	1.33	817	456	899
18	7	11	18	7	12	2988.6	506.56	0.46	783	446	856
18	7	11	19	7	12	3023.5	506.56	1.46	816	456	896
18	8	10	17	8	9	2955.7	565.45	0.95	754	436	820
18	8	10	18	8	11	2988.6	565.45	0.46	768	442	830
18	8	10	19	8	11	3023.5	565.45	1.05	750	436	814

18	9	9	17	9	8	2955.7	632.20	0.64	699	423	763
18	9	9	18	9	10	2988.6	632.20	0.42	672	417	733
18	9	9	19	9	10	3023.4	632.20	0.72	696	422	758
18	10	8	17	10	7	2955.7	706.77	0.42	656	413	718
18	10	8	18	10	9	2988.6	706.77	0.36	661	415	714
18	10	8	19	10	9	3023.4	706.77	0.47	649	412	709
19	1	19	18	1	18	2956.4	329.76	3.85	806	458	925
19	1	19	19	1	18	3015.5	329.76	0.04	842	482	965
19	1	19	20	1	20	3022.6	329.76	4.14	799	456	914
19	2	18	18	2	17	2954.9	358.14	3.32	822	466	953
19	2	18	19	2	17	3005.5	358.14	0.06	852	487	1004
19	2	18	20	2	19	3024.1	358.14	3.58	818	463	948
19	3	17	18	3	16	2953.9	384.21	2.90	883	506	1049
19	3	17	19	3	16	2994.6	384.21	0.11	909	524	1080
19	3	17	20	3	18	3025.2	384.21	3.13	885	506	1050
19	4	16	18	4	15	2953.5	412.65	2.48	879	504	1048
19	4	16	19	4	15	2989.5	412.65	0.21	880	505	1043
19	4	16	20	4	17	3025.6	412.65	2.69	877	502	1045
19	5	15	18	5	14	2953.7	447.60	2.04	910	507	1048
19	5	15	19	5	14	2988.7	447.60	0.20	947	528	1093
19	5	15	20	5	16	3025.5	447.60	2.22	909	506	1046
19	6	14	18	6	13	2953.7	490.50	1.61	871	483	972
19	6	14	19	6	13	2988.7	490.50	0.35	848	471	938
19	6	14	20	6	15	3025.4	490.50	1.75	870	482	970
19	7	13	18	7	12	2953.8	541.42	1.21	814	457	889
19	7	13	19	7	12	2988.6	541.42	0.37	836	465	906
19	7	13	20	7	14	3025.3	541.42	1.32	812	456	886
19	8	12	18	8	11	2953.8	600.26	0.87	749	436	815
19	8	12	19	8	11	2988.6	600.26	0.37	721	428	784
19	8	12	20	8	13	3025.3	600.26	0.96	747	436	813
19	9	11	18	9	10	2953.9	666.98	0.59	696	422	759
19	9	11	19	9	10	2988.6	666.98	0.34	706	425	760
19	9	11	20	9	12	3025.3	666.98	0.66	691	421	751
19	10	10	18	10	9	2953.9	741.52	0.39	649	412	709
19	10	10	19	10	9	2988.6	741.52	0.29	625	409	685
19	10	10	20	10	11	3025.2	741.52	0.43	646	412	705
20	0	20	19	0	19	2954.7	363.63	3.44	829	473	951
20	0	20	21	0	21	3024.2	363.63	3.70	824	470	942
20	1	19	19	1	18	2952.8	392.41	2.97	860	492	995
20	1	19	20	1	20	2959.9	392.41	0.03	821	467	948
20	1	19	21	1	20	3026.1	392.41	3.20	852	488	987
20	2	18	19	2	17	2951.0	412.71	2.69	905	524	1071
20	2	18	20	2	19	2969.5	412.71	0.04	881	506	1035
20	2	18	21	2	19	3028.1	412.71	2.90	908	525	1074
20	3	17	19	3	16	2950.6	428.28	2.48	895	520	1056
20	3	17	20	3	18	2981.1	428.28	0.08	871	501	1030
20	3	17	21	3	18	3028.7	428.28	2.68	889	518	1054
20	4	16	19	4	15	2951.4	450.80	2.18	935	537	1105
20	4	16	20	4	17	2987.4	450.80	0.16	934	533	1107
20	4	16	21	4	17	3027.9	450.80	2.36	937	537	1104
20	5	15	19	5	14	2951.8	484.56	1.81	925	517	1074
20	5	15	20	5	16	2988.6	484.56	0.23	885	495	1021
20	5	15	21	5	16	3027.4	484.56	1.96	923	517	1074
20	6	14	19	6	13	2951.9	527.27	1.43	890	487	979

20	6	14	20	6	15	2988.6	527.27	0.28	907	497	1002
20	6	14	21	6	15	3027.3	527.27	1.56	891	488	981
20	7	13	19	7	12	2952.0	578.11	1.08	816	456	884
20	7	13	20	7	14	2988.6	578.11	0.70	783	446	853
20	7	13	21	7	14	3027.2	578.11	1.18	815	456	884
20	8	12	19	8	11	2952.0	636.91	0.78	748	435	812
20	8	12	20	8	13	2988.6	636.91	0.29	764	441	823
20	8	12	21	8	13	3027.1	636.91	0.86	746	435	807
20	9	11	19	9	10	2952.0	703.59	0.54	691	421	751
20	9	11	20	9	12	2988.6	703.59	0.27	666	416	724
20	9	11	21	9	12	3027.1	703.59	0.59	689	420	748
20	10	10	19	10	9	2952.1	778.11	0.35	646	412	705
20	10	10	20	10	11	2988.6	778.11	0.23	652	413	703
20	10	10	21	10	11	3027.1	778.11	0.39	641	411	698

VI. APPENDIX B

LISTING OF LINEWIDTHS FOR TYPE B BAND

The format of this listing is the same as that used for the tabulation in the Appendix A. The line position and the relative line intensity values refer to the ν_9 fundamental band of C_2H_4 . All other spectral parameters listed can be applied to any type B vibrational-rotational band of ethylene.

Listing of Linewidth Parameters for Type B Band of C_2H_4

Lower State			Upper State			Approximate Line Position in the ν_9 Band (cm^{-1})	Rota- tional Energy of the Lower State (cm^{-1})	Rela- tive Line Inten- sity (ν_9 Band) at 300°K	γ^0 (in $10^{-4} cm^{-1} atm^{-1}$) of C_2H_4 Lines Broadened by			
J	K_a	K_c	J	K_a	K_c				C_2H_4	N_2	O_2	Air
									300°K	300°K	200°K	
0	0	0	1	1	1	3110.6	0.0	1.00	1628	814	471	1004
1	1	0	1	0	1	3100.9	5.87	1.46	1634	798	464	987
1	1	0	2	2	1	3120.4	5.87	1.47	1629	797	464	984
2	0	2	1	1	1	3105.2	5.48	0.52	1634	840	480	1035
2	0	2	2	1	1	3109.2	5.48	2.38	1635	815	469	1005
2	0	2	3	1	3	3113.9	5.48	1.98	1634	798	462	984
2	1	2	1	0	1	3097.6	9.18	1.43	1638	803	465	992
2	1	2	2	2	1	3117.1	9.18	0.80	1633	836	478	1028
2	1	2	3	0	3	3106.7	9.18	1.06	1631	810	466	995
2	1	2	3	2	1	3122.6	9.18	1.50	1632	828	474	1018
2	2	0	1	1	1	3089.3	21.30	1.32	1628	798	464	985
2	2	0	2	1	1	3093.4	21.30	0.80	1629	836	478	1027
2	2	0	3	3	1	3130.2	21.30	2.26	1625	760	449	939
3	1	2	2	2	1	3110.8	15.44	0.17	1623	854	486	1048
3	1	2	3	0	3	3100.5	15.44	3.07	1622	810	465	990
3	1	2	3	2	1	3116.3	15.44	1.52	1623	833	476	1020
3	1	2	4	2	3	3123.6	15.44	1.76	1617	825	472	1006
3	2	2	2	1	1	3087.9	26.78	1.46	1630	829	474	1018
3	2	2	3	1	3	3092.6	26.78	1.26	1630	833	475	1021
3	2	2	3	3	1	3124.7	26.78	0.80	1626	825	474	1012
3	2	2	4	1	3	3101.3	26.78	0.37	1610	834	477	1015
3	2	2	4	3	1	3132.0	26.78	2.29	1628	831	475	1018
3	3	0	2	2	1	3079.7	46.53	1.97	1625	760	449	938
3	3	0	3	2	1	3085.2	46.53	0.71	1625	825	474	1012
3	3	0	4	4	1	3139.9	46.53	2.82	1622	731	438	900
4	0	4	3	1	3	3101.1	18.21	1.60	1613	804	463	979
4	0	4	4	1	3	3109.8	18.21	3.72	1593	806	464	972
4	0	4	5	1	5	3116.8	18.21	2.94	1583	800	461	961
4	1	4	3	0	3	3094.5	21.37	2.32	1617	801	461	977
4	1	4	4	2	3	3117.7	21.37	1.77	1612	826	472	1005

4	1	4	5	0	5	3110.8	21.37	2.22	1584	801	462	964
4	1	4	5	2	3	3127.0	21.37	1.53	1595	816	469	988
4	2	2	3	1	3	3085.2	34.18	1.38	1621	823	471	1005
4	2	2	3	3	1	3117.3	34.18	0.11	1618	848	483	1037
4	2	2	4	1	3	3093.9	34.18	2.02	1601	825	473	999
4	2	2	4	3	1	3124.6	34.18	1.39	1620	839	479	1025
4	2	2	5	3	3	3133.8	34.18	2.33	1611	835	477	1016
4	3	2	3	2	1	3077.9	53.86	1.98	1627	831	475	1018
4	3	2	4	2	3	3085.2	53.86	1.25	1621	839	479	1026
4	3	2	4	4	1	3132.6	53.86	0.72	1625	805	466	989
4	3	2	5	2	3	3094.5	53.86	0.24	1604	842	481	1025
4	3	2	5	4	1	3141.7	53.86	2.78	1629	824	472	1009
4	4	0	3	3	1	3070.0	81.49	2.33	1622	731	438	900
4	4	0	4	3	1	3077.3	81.49	0.62	1625	805	466	989
4	4	0	5	5	1	3149.6	81.49	3.08	1620	704	431	870
5	1	4	4	2	3	3106.4	32.65	0.60	1583	822	472	990
5	1	4	5	0	5	3099.5	32.65	3.98	1555	799	463	952
5	1	4	5	2	3	3115.7	32.65	2.77	1566	814	469	976
5	1	4	6	2	5	3126.5	32.65	2.08	1547	806	466	960
5	2	4	4	1	3	3084.8	43.23	1.72	1587	817	469	985
5	2	4	5	1	5	3091.8	43.23	1.95	1578	817	469	981
5	2	4	5	3	3	3124.7	43.23	1.87	1598	835	477	1012
5	2	4	6	1	5	3105.8	43.23	0.82	1547	807	468	962
5	2	4	6	3	3	3135.8	43.23	2.34	1580	828	475	998
5	3	2	4	2	3	3076.0	63.03	1.99	1613	836	477	1018
5	3	2	4	4	1	3123.4	63.03	0.08	1617	835	478	1020
5	3	2	5	2	3	3085.3	63.03	1.69	1596	834	478	1011
5	3	2	5	4	1	3132.6	63.03	1.27	1620	838	478	1023
5	3	2	6	4	3	3143.6	63.03	2.75	1609	838	479	1021
5	4	2	4	3	1	3068.2	90.65	2.28	1629	824	472	1009
5	4	2	5	3	3	3077.3	90.65	1.09	1620	838	478	1023
5	4	2	5	5	1	3140.5	90.65	0.62	1624	786	458	966
5	4	2	6	3	3	3088.3	90.65	0.16	1603	842	481	1026
5	4	2	6	5	1	3151.4	90.65	2.99	1627	813	467	997
5	5	0	4	4	1	3060.3	126.16	2.42	1620	704	431	870
5	5	0	5	4	1	3069.4	126.16	0.51	1621	786	458	966
5	5	0	6	6	1	3159.3	126.16	3.05	1602	683	425	845
6	0	6	5	1	5	3097.0	38.03	2.69		792	461	942
6	0	6	6	1	5	3111.0	38.03	4.26		785	460	927
6	0	6	7	1	7	3119.5	38.03	3.86		779	459	918
6	1	6	5	0	5	3091.7	40.48	3.17		792	461	942
6	1	6	6	2	5	3118.7	40.48	2.33		803	466	955
6	1	6	7	0	7	3115.0	40.48	3.39		780	459	921
6	1	6	7	2	5	3132.1	40.48	1.33		790	463	939
6	2	4	5	1	5	3080.4	54.57	1.27		806	466	963
6	2	4	5	3	3	3113.4	54.57	0.39		830	477	1001
6	2	4	6	1	5	3094.5	54.57	3.18		798	466	947
6	2	4	6	3	3	3124.4	54.57	2.29		822	474	986
6	2	4	7	3	5	3137.3	54.57	2.36		812	471	970
6	3	4	5	2	3	3074.3	74.03	1.99		827	475	997
6	3	4	6	2	5	3085.1	74.03	2.03		823	474	987
6	3	4	6	4	3	3132.6	74.03	1.70		838	480	1017
6	3	4	7	2	5	3098.5	74.03	0.51		814	472	975
6	3	4	7	4	3	3145.4	74.03	2.71		833	478	1005

6	4	2	5	3	3	3066.3	101.65	2.23	838	479	1021
6	4	2	5	5	1	3129.5	101.65	0.05	820	472	1002
6	4	2	6	3	3	3077.3	101.65	1.46	838	480	1017
6	4	2	6	5	1	3140.5	101.65	1.09	832	476	1017
6	4	2	7	5	3	3153.3	101.65	2.90	836	478	1018
6	5	2	5	4	1	3058.5	137.15	2.32	813	467	997
6	5	2	6	4	3	3069.4	137.15	0.90	832	476	1017
6	5	2	6	6	1	3148.3	137.15	0.50	769	451	947
6	5	2	7	4	3	3082.3	137.15	0.11	839	480	1022
6	5	2	7	6	1	3161.1	137.15	2.92	802	463	983
6	6	0	5	5	1	3050.6	180.53	2.27	683	425	845
6	6	0	6	5	1	3061.6	180.53	0.39	769	451	947
6	6	0	7	7	1	3169.0	180.53	2.79	665	421	824
7	1	6	6	2	5	3101.7	57.43	1.04	791	463	938
7	1	6	7	0	7	3098.1	57.43	4.08	770	457	904
7	1	6	7	2	5	3115.2	57.43	3.93	780	461	923
7	1	6	8	2	7	3129.0	57.43	2.35	772	458	909
7	2	6	6	1	5	3082.1	66.94	1.96	788	463	934
7	2	6	7	1	7	3090.6	66.94	2.29	786	462	930
7	2	6	7	3	5	3124.9	66.94	2.57	806	470	960
7	2	6	8	1	7	3110.6	66.94	1.29	772	459	913
7	2	6	8	3	5	3139.6	66.94	2.28	794	466	947
7	3	4	6	2	5	3072.2	86.90	1.95	813	471	972
7	3	4	6	4	3	3119.7	86.90	0.29	835	480	1010
7	3	4	7	2	5	3085.7	86.90	2.36	804	469	960
7	3	4	7	4	3	3132.5	86.90	2.04	828	477	996
7	3	4	8	4	5	3147.2	86.90	2.65	818	474	981
7	4	4	6	3	3	3064.5	114.48	2.17	833	478	1005
7	4	4	7	3	5	3077.3	114.48	1.76	828	477	995
7	4	4	7	5	3	3140.4	114.48	1.45	838	480	1017
7	4	4	8	3	5	3092.1	114.48	0.36	821	476	986
7	4	4	8	5	3	3155.1	114.48	2.80	835	479	1007
7	5	2	6	4	3	3056.6	149.97	2.23	836	478	1018
7	5	2	6	6	1	3135.5	149.97	0.04	806	465	984
7	5	2	7	4	3	3069.5	149.97	1.20	838	480	1017
7	5	2	7	6	1	3148.3	149.97	0.88	825	472	1005
7	5	2	8	6	3	3163.0	149.97	2.79	833	476	1010
7	6	2	6	5	1	3048.8	193.35	2.15	802	463	983
7	6	2	7	5	3	3061.6	193.35	0.70	825	472	1005
7	6	2	7	7	1	3156.2	193.35	0.39	755	445	927
7	6	2	8	5	3	3076.2	193.35	0.08	834	477	1012
7	6	2	8	7	1	3170.8	193.35	2.64	791	458	966
7	7	0	6	6	1	3040.9	244.58	1.97	665	421	823
7	7	0	7	6	1	3053.7	244.58	0.29	754	445	926
7	7	0	8	8	1	3178.7	244.58	2.37	650	417	803
8	0	8	7	1	7	3092.8	64.74	3.67	764	456	898
8	0	8	8	1	7	3112.8	64.74	4.06	752	453	883
8	0	8	9	1	9	3122.2	64.74	4.66	748	452	878
8	1	8	7	0	7	3089.0	66.45	3.93	764	455	896
8	1	8	8	2	7	3120.0	66.45	2.54	768	457	905
8	1	8	9	0	9	3119.1	66.45	4.40	749	452	880
8	1	8	9	2	7	3138.1	66.45	0.98	756	454	893
8	2	6	7	1	7	3074.9	82.63	0.99	773	459	914
8	2	6	7	3	5	3109.2	82.63	0.64	795	467	950

8	2	6	8	1	7	3094.9	82.63	4.18	761	456	899
8	2	6	8	3	5	3123.9	82.63	2.90	784	464	935
8	2	6	9	3	7	3140.4	82.63	2.28	774	460	921
8	3	6	7	2	5	3071.0	101.56	1.94	792	466	946
8	3	6	8	2	7	3084.9	101.56	2.51	786	464	937
8	3	6	8	4	5	3132.5	101.56	2.30	810	472	971
8	3	6	9	2	7	3103.0	101.56	0.72	776	461	926
8	3	6	9	4	5	3149.0	101.56	2.56	800	469	959
8	4	4	7	3	5	3062.7	129.15	2.10	819	474	981
8	4	4	7	5	3	3125.8	129.15	0.21	837	480	1012
8	4	4	8	3	5	3077.4	129.15	1.98	810	472	971
8	4	4	8	5	3	3140.4	129.15	1.73	831	479	999
8	4	4	9	5	5	3156.9	129.15	2.69	823	477	987
8	5	4	7	4	3	3054.8	164.63	2.13	835	479	1007
8	5	4	8	4	5	3069.5	164.63	1.43	831	479	999
8	5	4	8	6	3	3148.3	164.63	1.18	836	479	1011
8	5	4	9	4	5	3086.0	164.63	0.25	825	477	992
8	5	4	9	6	3	3164.8	164.63	2.65	834	479	1004
8	6	2	7	5	3	3046.9	208.00	2.03	833	476	1010
8	6	2	7	7	1	3141.5	208.00	0.02	792	460	965
8	6	2	8	5	3	3061.6	208.00	0.93	836	479	1011
8	6	2	8	7	1	3156.2	208.00	0.68	816	468	990
8	6	2	9	7	3	3172.7	208.00	2.49	826	473	997
8	7	2	7	6	1	3039.1	259.23	1.84	791	458	966
8	7	2	8	6	3	3053.7	259.23	0.52	816	468	990
8	7	2	8	8	1	3164.0	259.23	0.28	741	440	904
8	7	2	9	6	3	3070.2	259.23	0.05	827	474	999
8	7	2	9	8	1	3180.5	259.23	2.22	779	453	946
8	8	0	7	7	1	3031.2	318.30	1.59	649	417	801
8	8	0	8	7	1	3045.9	318.30	0.21	735	438	897
8	8	0	9	9	1	3188.3	318.30	1.89	632	414	779
9	1	8	8	2	7	3096.8	89.68	1.45	756	454	894
9	1	8	9	0	9	3095.9	89.68	3.59	738	449	871
9	1	8	9	2	7	3114.8	89.68	4.77	745	451	883
9	1	8	10	2	9	3131.3	89.68	2.56	738	449	876
9	2	8	8	1	7	3079.7	97.87	2.15	753	454	889
9	2	8	9	1	9	3089.1	97.87	2.33	751	453	887
9	2	8	9	3	7	3125.2	97.87	2.96	768	459	914
9	2	8	10	1	9	3115.6	97.87	1.72	740	449	880
9	2	8	10	3	7	3143.7	97.87	2.06	759	455	903
9	3	6	8	2	7	3068.3	118.20	1.79	776	460	923
9	3	6	8	4	5	3115.9	118.20	0.48	802	470	964
9	3	6	9	2	7	3086.3	118.20	2.82	766	458	914
9	3	6	9	4	5	3132.4	118.20	2.49	792	467	950
9	3	6	10	4	7	3150.8	118.20	2.45	782	463	938
9	4	6	8	3	5	3060.9	145.66	2.02	800	469	959
9	4	6	9	3	7	3077.4	145.66	2.14	792	467	949
9	4	6	9	5	5	3140.4	145.66	1.93	816	474	978
9	4	6	10	3	7	3096.0	145.66	0.52	785	464	942
9	4	6	10	5	5	3158.7	145.66	2.56	806	472	967
9	5	4	8	4	5	3053.0	181.12	2.03	823	477	987
9	5	4	8	6	3	3131.8	181.12	0.14	836	480	1008
9	5	4	9	4	5	3069.5	181.12	1.60	816	474	978
9	5	4	9	6	3	3148.3	181.12	1.39	831	479	997

9	5	4	10	6	5	3166.6	181.12	2.51	825	477	987
9	6	4	8	5	3	3045.1	224.48	1.92	834	479	1004
9	6	4	9	5	5	3061.6	224.48	1.10	832	479	998
9	6	4	9	7	3	3156.2	224.48	0.90	832	477	1000
9	6	4	10	5	5	3079.9	224.48	0.17	827	478	992
9	6	4	10	7	3	3174.5	224.48	2.34	831	478	995
9	7	2	8	6	3	3037.2	275.70	1.72	826	473	997
9	7	2	8	8	1	3147.6	275.70	0.02	778	454	945
9	7	2	9	6	3	3053.7	275.70	0.68	832	477	1000
9	7	2	9	8	1	3164.0	275.70	0.50	804	463	970
9	7	2	10	8	3	3182.3	275.70	2.07	816	470	980
9	8	2	8	7	1	3029.4	334.77	1.47	778	453	945
9	8	2	9	7	3	3045.9	334.77	0.36	804	463	970
9	8	2	9	9	1	3171.8	334.77	0.20	722	434	877
9	8	2	10	7	3	3064.2	334.77	0.03	816	470	981
9	8	2	10	9	1	3190.1	334.77	1.76	762	447	919
9	9	0	8	8	1	3021.6	401.67	1.20	642	416	789
9	9	0	9	8	1	3038.1	401.67	0.14	706	430	858
9	9	0	10	10	1	3197.9	401.67	1.42	609	409	744
10	0	10	9	1	9	3088.8	98.15	4.37	736	448	867
10	0	10	10	1	9	3115.4	98.15	3.42	724	445	861
10	0	10	11	1	11	3125.0	98.15	5.18	721	444	858
10	1	10	9	0	9	3086.3	99.24	4.48	734	447	866
10	1	10	10	2	9	3121.7	99.24	2.48	736	448	874
10	1	10	11	0	11	3123.0	99.24	5.05	722	444	859
10	1	10	11	2	9	3145.1	99.24	0.64	727	445	868
10	2	8	9	1	9	3063.5	118.48	0.66	742	449	879
10	2	9	9	3	7	3104.6	118.48	0.81	760	455	907
10	2	8	10	1	9	3095.0	118.48	4.72	730	446	873
10	2	9	10	3	7	3123.1	118.48	3.29	751	452	897
10	2	9	11	3	9	3143.2	118.48	2.11	743	450	889
10	3	9	9	2	7	3068.1	136.47	1.80	757	455	903
10	3	8	10	2	9	3084.5	136.47	2.72	753	453	898
10	3	8	10	4	7	3132.5	136.47	2.61	775	461	929
10	3	8	11	2	9	3107.8	136.47	0.87	746	450	893
10	3	9	11	4	7	3152.7	136.47	2.32	767	458	918
10	4	6	9	3	7	3059.0	164.02	1.91	783	463	937
10	4	6	9	5	5	3122.0	164.02	0.35	809	472	972
10	4	6	10	3	7	3077.6	164.02	2.25	776	461	929
10	4	6	10	5	5	3140.4	164.02	2.07	798	469	959
10	4	6	11	5	7	3160.6	164.02	2.41	790	466	947
10	5	6	9	4	5	3051.2	199.46	1.91	806	472	967
10	5	6	10	4	7	3069.5	199.46	1.71	798	469	959
10	5	6	10	6	5	3148.3	199.46	1.54	818	475	980
10	5	6	11	4	7	3089.7	199.46	0.37	792	467	952
10	5	6	11	6	5	3168.4	199.46	2.36	810	473	970
10	6	4	9	5	5	3043.3	242.79	1.79	825	477	987
10	6	4	9	7	3	3137.9	242.79	0.10	832	478	998
10	6	4	10	5	5	3061.6	242.79	1.22	818	475	980
10	6	4	10	7	3	3156.2	242.79	1.06	829	478	990
10	6	4	11	7	5	3176.3	242.79	2.18	823	477	982
10	7	4	9	6	3	3035.4	294.01	1.60	831	478	995
10	7	4	10	6	5	3053.7	294.01	0.80	829	478	990
10	7	4	10	8	3	3164.0	294.01	0.66	823	474	984

10	7	4	11	6	5	3073.9	294.01	0.11	826	478	986
10	7	4	11	8	3	3184.1	294.01	1.92	824	475	982
10	8	2	9	7	3	3027.6	353.07	1.36	817	470	980
10	8	2	9	9	1	3153.6	353.07	0.01	763	448	920
10	8	2	10	7	3	3045.9	353.07	0.48	823	474	985
10	8	2	10	9	1	3171.8	353.07	0.35	787	457	944
10	8	2	11	9	3	3192.0	353.07	1.62	803	465	959
10	9	2	9	8	1	3019.8	419.96	1.10	759	446	916
10	9	2	10	8	3	3038.1	419.96	0.24	786	457	943
10	9	2	10	10	1	3179.6	419.96	0.13	688	426	832
10	9	2	11	8	3	3058.2	419.96	0.02	799	464	955
10	9	2	11	10	1	3199.8	419.96	1.31	737	440	885
10	10	0	9	9	1	3012.0	494.66	0.86	709	433	864
10	10	0	10	9	1	3030.3	494.66	0.09	714	433	864
10	10	0	11	11	1	3207.5	494.66	1.01	590	407	721
11	1	10	10	2	9	3091.7	129.25	1.79	727	445	871
11	1	10	11	0	11	3093.0	129.25	2.86	714	442	857
11	1	10	11	2	9	3115.0	129.25	5.01	719	442	866
11	1	10	12	2	11	3133.3	129.25	2.69	715	441	863
11	2	10	10	1	9	3077.6	135.94	2.27	724	445	868
11	2	10	11	1	11	3087.2	135.94	2.15	723	445	866
11	2	10	11	3	9	3125.7	135.94	3.04	739	449	886
11	2	10	12	1	11	3120.7	135.94	2.10	717	442	865
11	2	10	12	3	9	3148.3	135.94	1.70	731	446	880
11	3	8	10	2	9	3063.9	157.02	1.51	745	450	890
11	3	8	10	4	7	3111.9	157.02	0.60	770	458	923
11	3	8	11	2	9	3087.3	157.02	3.10	737	448	886
11	3	8	11	4	7	3132.2	157.02	2.68	762	455	912
11	3	8	12	4	9	3154.2	157.02	2.18	755	452	904
11	4	8	10	3	7	3057.4	184.22	1.79	768	458	918
11	4	8	11	3	9	3077.4	184.22	2.30	763	455	912
11	4	8	11	5	7	3140.4	184.22	2.15	783	463	939
11	4	8	12	3	9	3100.0	184.22	0.61	757	453	908
11	4	8	12	5	7	3162.4	184.22	2.26	776	460	928
11	5	6	10	4	7	3049.3	219.63	1.78	790	466	948
11	5	6	10	6	5	3128.1	219.63	0.24	813	474	974
11	5	6	11	4	7	3069.6	219.63	1.77	783	463	939
11	5	6	11	6	5	3148.3	219.63	1.64	803	470	962
11	5	6	12	6	7	3170.3	219.63	2.19	795	468	951
11	6	6	10	5	5	3041.5	262.95	1.67	810	473	970
11	6	6	11	5	7	3061.6	262.95	1.29	803	470	962
11	6	6	11	7	5	3156.1	262.95	1.17	818	476	976
11	6	6	12	5	7	3083.6	262.95	0.25	798	469	955
11	6	6	12	7	5	3178.1	262.95	2.02	811	473	966
11	7	4	10	6	5	3033.6	314.15	1.48	823	477	982
11	7	4	10	8	3	3143.9	314.15	0.06	825	476	985
11	7	4	11	6	5	3053.8	314.15	0.88	818	476	976
11	7	4	11	8	3	3164.0	314.15	0.77	823	476	979
11	7	4	12	8	5	3186.0	314.15	1.77	819	476	972
11	8	4	10	7	3	3025.8	373.20	1.25	824	475	982
11	8	4	11	7	5	3045.9	373.20	0.56	823	476	979
11	8	4	11	9	3	3171.8	373.20	0.46	811	469	964
11	8	4	12	7	5	3067.9	373.20	0.07	821	476	975
11	8	4	12	9	3	3193.8	373.20	1.49	814	472	965

11	9	2	10	8	3	3017.9	440.08	1.01	804	465	960
11	9	2	10	10	1	3159.5	440.08	0.01	736	440	881
11	9	2	11	8	3	3038.1	440.08	0.32	812	470	965
11	9	2	11	10	1	3179.6	440.08	0.23	760	448	906
11	9	2	12	10	3	3201.6	440.08	1.19	782	457	928
11	10	2	10	9	1	3010.1	514.77	0.78	728	436	874
11	10	2	11	9	3	3030.3	514.77	0.15	756	447	902
11	10	2	11	11	1	3167.4	514.77	0.09	644	416	779
11	10	2	12	9	3	3052.2	514.77	0.01	773	454	919
11	10	2	12	11	1	3209.4	514.77	0.92	736	441	886
12	0	12	11	1	11	3085.0	138.13	4.68	712	441	854
12	0	12	12	1	11	3118.5	138.13	2.70	707	438	855
12	0	12	13	1	13	3127.9	138.13	5.33	704	438	851
12	1	12	11	0	11	3083.5	138.78	4.72	710	441	854
12	1	12	12	2	11	3123.8	138.78	2.23	713	441	861
12	1	12	13	0	13	3126.8	138.78	5.27	704	438	852
12	1	12	13	2	11	3153.1	138.78	0.38	709	439	859
12	2	10	11	1	11	3061.0	162.16	0.39	717	442	863
12	2	10	11	3	9	3099.5	162.16	0.90	733	446	884
12	2	10	12	1	11	3094.5	162.16	4.61	711	439	863
12	2	10	12	3	9	3122.1	162.16	3.50	726	444	879
12	2	10	13	3	11	3145.4	162.16	1.90	721	442	874
12	3	10	11	2	9	3065.6	178.74	1.62	731	445	880
12	3	10	12	2	11	3083.8	178.74	2.66	727	445	879
12	3	10	12	4	9	3132.5	178.74	2.67	749	451	900
12	3	10	13	2	11	3113.1	178.74	0.96	724	442	878
12	3	10	13	4	9	3156.4	178.74	2.00	742	448	894
12	4	8	11	3	9	3055.3	206.31	1.65	755	453	904
12	4	8	11	5	7	3118.3	206.31	0.44	778	461	933
12	4	8	12	3	9	3077.9	206.31	2.32	749	451	900
12	4	8	12	5	7	3140.3	206.31	2.17	771	458	923
12	4	8	13	5	9	3164.2	206.31	2.09	764	455	914
12	5	8	11	4	7	3047.5	241.65	1.65	776	460	928
12	5	8	12	4	9	3069.6	241.65	1.79	771	458	922
12	5	8	12	6	7	3148.2	241.65	1.68	789	465	943
12	5	8	13	4	9	3093.5	241.65	0.43	766	456	918
12	5	8	13	6	7	3172.1	241.65	2.02	782	462	933
12	6	6	11	5	7	3039.6	284.94	1.54	795	468	951
12	6	6	11	7	5	3134.2	284.94	0.16	813	474	970
12	6	6	12	5	7	3061.7	284.94	1.33	789	465	943
12	6	6	12	7	5	3156.1	284.94	1.23	805	471	959
12	6	6	13	7	7	3179.9	284.94	1.85	797	469	949
12	7	6	11	6	5	3031.8	336.12	1.36	811	473	966
12	7	6	12	6	7	3053.8	336.12	0.93	805	471	959
12	7	6	12	8	5	3164.0	336.12	0.84	814	475	966
12	7	6	13	6	7	3077.6	336.12	0.16	800	470	953
12	7	6	13	8	5	3187.8	336.12	1.62	808	473	959
12	8	4	11	7	5	3023.9	395.16	1.14	819	476	972
12	8	4	11	9	3	3149.9	395.16	0.04	813	472	966
12	8	4	12	7	5	3045.9	395.16	0.61	814	475	966
12	8	4	12	9	3	3171.8	395.16	0.53	814	474	963
12	8	4	13	9	5	3195.6	395.16	1.36	811	473	959
12	9	4	11	8	3	3016.1	462.03	0.92	814	472	964
12	9	4	12	8	5	3038.1	462.03	0.37	814	473	963

12	9	4	12	10	3	3179.6	462.03	0.30	790	462	936
12	9	4	13	8	5	3061.9	462.03	0.04	812	474	962
12	9	4	13	10	3	3203.4	462.03	1.08	800	468	946
12	10	2	11	9	3	3008.3	536.71	0.71	786	459	934
12	10	2	11	11	1	3165.5	536.71	0.00	695	429	829
12	10	2	12	9	3	3030.3	536.71	0.20	794	464	941
12	10	2	12	11	1	3187.4	536.71	0.15	744	444	886
12	10	2	13	11	3	3211.2	536.71	0.83	748	445	885
13	1	12	12	2	11	3086.6	175.95	2.04	710	439	862
13	1	12	13	0	13	3089.6	175.95	2.18	702	436	854
13	1	12	13	2	11	3115.9	175.95	4.59	707	437	860
13	1	12	14	2	13	3135.3	175.95	2.74	705	436	859
13	2	12	12	1	11	3075.6	181.09	2.33	708	438	860
13	2	12	13	1	13	3084.9	181.09	1.84	707	438	858
13	2	12	13	3	11	3126.5	181.09	2.87	720	441	873
13	2	12	14	1	13	3125.8	181.09	2.37	706	437	859
13	2	12	14	3	11	3153.5	181.09	1.27	716	439	869
13	3	10	12	2	11	3059.1	203.50	1.16	722	442	874
13	3	10	12	4	9	3107.7	203.50	0.64	745	449	897
13	3	10	13	2	11	3088.4	203.50	3.23	719	440	873
13	3	10	13	4	9	3131.7	203.50	2.64	738	446	891
13	3	10	14	4	11	3157.4	203.50	1.84	733	444	886
13	4	10	12	3	9	3054.1	230.19	1.53	742	448	894
13	4	10	13	3	11	3077.4	230.19	2.26	738	447	891
13	4	10	13	5	9	3140.3	230.19	2.15	759	453	909
13	4	10	14	3	11	3104.4	230.19	0.64	735	445	889
13	4	10	14	5	9	3166.0	230.19	1.91	752	451	902
13	5	8	12	4	9	3045.7	265.51	1.51	764	455	914
13	5	8	12	6	7	3124.4	265.51	0.31	784	463	937
13	5	8	13	4	9	3069.7	265.51	1.77	759	453	909
13	5	8	13	6	7	3148.2	265.51	1.68	777	460	927
13	5	8	14	6	9	3173.9	265.51	1.85	771	458	919
13	6	8	12	5	7	3037.8	308.77	1.40	782	462	933
13	6	8	13	5	9	3061.7	308.77	1.33	777	460	927
13	6	8	13	7	7	3156.1	308.77	1.25	792	467	942
13	6	8	14	5	9	3087.4	308.77	0.29	774	458	922
13	6	8	14	7	7	3181.8	308.77	1.69	786	464	934
13	7	6	12	6	7	3030.0	359.93	1.23	797	469	949
13	7	6	12	8	5	3140.2	359.93	0.11	810	474	962
13	7	6	13	6	7	3063.8	359.93	0.95	792	467	942
13	7	6	13	8	5	3164.0	359.93	0.88	803	471	952
13	7	6	14	8	7	3189.6	359.93	1.47	797	469	944
13	8	6	12	7	5	3022.1	418.95	1.03	808	473	959
13	8	6	13	7	7	3045.9	418.95	0.64	803	471	952
13	8	6	13	9	5	3171.8	418.95	0.58	808	473	955
13	8	6	14	7	7	3071.6	418.95	0.10	799	470	948
13	8	6	14	9	5	3197.4	418.95	1.23	803	472	949
13	9	4	12	8	5	3014.3	485.81	0.83	811	473	959
13	9	4	12	10	3	3155.8	485.81	0.02	795	465	941
13	9	4	13	8	5	3038.1	485.81	0.40	808	473	955
13	9	4	13	10	3	3179.6	485.81	0.35	802	469	946
13	9	4	14	10	5	3205.2	485.81	0.98	800	470	943
13	10	4	12	9	3	3006.5	560.47	0.64	799	467	944
13	10	4	13	9	5	3030.3	560.47	0.23	800	469	943

13	10	4	13	11	3	3187.4	560.47	0.19	757	449	891
13	10	4	14	9	5	3055.9	560.47	0.02	799	469	944
13	10	4	14	11	3	3213.0	560.47	0.75	781	460	920
14	0	14	13	1	13	3081.4	184.67	4.60	700	436	850
14	0	14	14	1	13	3122.2	184.67	2.07	700	435	853
14	0	14	15	1	15	3130.9	184.67	5.12	698	434	849
14	1	14	13	0	13	3080.5	185.03	4.61	699	436	850
14	1	14	14	2	13	3126.2	185.03	1.87	703	436	857
14	1	14	15	0	15	3130.3	185.03	5.09	698	434	850
14	1	14	15	2	13	3162.1	185.03	0.22	702	434	855
14	2	12	13	1	13	3052.4	213.60	0.22	705	436	857
14	2	12	13	3	11	3094.0	213.60	0.93	717	439	871
14	2	12	14	1	13	3093.3	213.60	3.94	704	435	858
14	2	12	14	3	11	3121.0	213.60	3.52	714	438	868
14	2	12	15	3	13	3147.3	213.60	1.68	711	437	864
14	3	12	13	2	11	3063.5	228.37	1.43	715	439	869
14	3	12	14	2	13	3082.9	228.37	2.40	714	439	868
14	3	12	14	4	11	3132.5	228.37	2.53	731	443	883
14	3	12	15	2	13	3118.8	228.37	1.01	713	437	866
14	3	12	15	4	11	3160.3	228.37	1.63	726	442	878
14	4	10	13	3	11	3051.5	256.04	1.36	733	445	886
14	4	10	13	5	9	3114.4	256.04	0.47	755	452	906
14	4	10	14	3	11	3078.6	256.04	2.22	730	443	884
14	4	10	14	5	9	3140.1	256.04	2.09	748	449	899
14	4	10	15	5	11	3167.7	256.04	1.73	742	447	894
14	5	10	13	4	9	3044.0	291.22	1.37	752	451	902
14	5	10	14	4	11	3069.7	291.22	1.72	748	449	899
14	5	10	14	6	9	3148.2	291.22	1.64	767	456	914
14	5	10	15	4	11	3097.4	291.22	0.45	745	448	895
14	5	10	15	6	9	3175.7	291.22	1.67	760	453	908
14	6	8	13	5	9	3036.0	334.45	1.27	771	458	919
14	6	8	13	7	7	3130.4	334.45	0.21	788	465	937
14	6	8	14	5	9	3061.7	334.45	1.30	767	456	914
14	6	8	14	7	7	3156.1	334.45	1.24	781	462	928
14	6	8	15	7	9	3183.6	334.45	1.53	775	459	921
14	7	8	13	6	7	3028.1	385.58	1.11	786	464	934
14	7	8	14	6	9	3053.8	385.58	0.94	781	462	928
14	7	8	14	8	7	3164.0	385.58	0.88	792	467	938
14	7	8	15	6	9	3081.3	385.58	0.19	777	460	924
14	7	8	15	8	7	3191.4	385.58	1.33	786	464	932
14	8	6	13	7	7	3020.3	444.58	0.93	797	469	944
14	8	6	13	9	5	3146.2	444.58	0.07	805	472	952
14	8	6	14	7	7	3045.9	444.58	0.64	792	467	939
14	8	6	14	9	5	3171.8	444.58	0.60	799	471	944
14	8	6	15	9	7	3199.2	444.58	1.10	793	468	938
14	9	6	13	8	5	3012.5	511.42	0.74	803	472	949
14	9	6	14	3	7	3038.1	511.42	0.41	798	470	944
14	9	6	14	10	5	3179.6	511.42	0.38	798	470	940
14	9	6	15	8	7	3065.6	511.42	0.06	795	469	941
14	9	6	15	10	5	3207.0	511.42	0.88	795	469	937
14	10	4	13	9	5	3004.7	586.07	0.57	801	470	944
14	10	4	13	11	3	3161.8	586.07	0.01	766	454	902
14	10	4	14	9	5	3030.3	586.07	0.25	799	470	941
14	10	4	14	11	3	3187.4	586.07	0.22	783	462	922

14	10	4	15	11	5	3214.8	586.07	0.67	783	463	920
15	1	14	14	2	13	3081.7	229.55	2.16	704	435	857
15	1	14	15	0	15	3085.8	229.55	1.62	699	433	852
15	1	14	15	2	13	3117.6	229.55	3.74	703	433	856
15	1	14	16	2	15	3137.3	229.55	2.68	702	433	854
15	2	14	14	1	13	3073.6	233.23	2.30	702	434	856
15	2	14	15	1	15	3082.4	233.23	1.49	701	434	855
15	2	14	15	3	13	3127.6	233.23	2.51	710	436	864
15	2	14	16	1	15	3130.6	233.23	2.48	702	433	855
15	2	14	16	3	13	3159.6	233.23	0.84	708	435	860
15	3	12	14	2	13	3053.5	257.79	0.79	711	437	865
15	3	12	14	4	11	3103.1	257.79	0.62	728	442	880
15	3	12	15	2	13	3089.3	257.79	3.17	711	436	863
15	3	12	15	4	11	3130.9	257.79	2.45	724	440	876
15	3	12	16	4	13	3160.2	257.79	1.49	721	439	871
15	4	12	14	3	11	3051.0	283.58	1.24	726	441	878
15	4	12	15	3	13	3077.3	283.58	2.06	724	441	876
15	4	12	15	5	11	3140.2	283.58	1.99	740	446	890
15	4	12	16	3	13	3109.3	283.58	0.60	722	439	872
15	4	12	16	5	11	3169.6	283.58	1.55	735	444	886
15	5	10	14	4	11	3042.1	318.79	1.23	743	447	894
15	5	10	14	6	9	3120.6	318.79	0.33	763	454	911
15	5	10	15	4	11	3069.9	318.79	1.65	740	446	890
15	5	10	15	6	9	3148.1	318.79	1.58	756	451	904
15	5	10	16	6	11	3177.5	318.79	1.50	750	449	898
15	6	10	14	5	9	3034.2	361.96	1.14	760	453	908
15	6	10	15	5	11	3061.8	361.96	1.25	756	451	904
15	6	10	15	7	9	3156.1	361.96	1.20	771	457	917
15	6	10	16	5	11	3091.2	361.96	0.30	752	450	900
15	6	10	16	7	9	3185.4	361.96	1.36	765	455	911
15	7	8	14	6	9	3026.3	413.06	0.99	775	459	921
15	7	8	14	8	7	3136.5	413.06	0.13	788	465	934
15	7	8	15	6	9	3053.8	413.06	0.91	771	457	917
15	7	8	15	8	7	3163.9	413.06	0.87	781	462	927
15	7	8	16	8	9	3193.2	413.06	1.18	777	460	921
15	8	8	14	7	7	3018.5	472.04	0.83	786	464	932
15	8	8	15	7	9	3046.0	472.04	0.63	781	462	927
15	8	8	15	9	7	3171.8	472.04	0.60	788	466	933
15	8	8	16	7	9	3075.3	472.04	0.12	778	461	923
15	8	8	16	9	7	3201.0	472.04	0.98	784	464	928
15	9	6	14	8	7	3010.7	538.86	0.66	793	468	938
15	9	6	14	10	5	3152.2	538.86	0.04	795	469	939
15	9	6	15	8	7	3038.1	538.86	0.41	788	466	933
15	9	6	15	10	5	3179.6	538.86	0.39	791	468	934
15	9	6	16	10	7	3208.8	538.86	0.78	787	466	929
15	10	6	14	9	5	3002.9	613.50	0.50	794	469	937
15	10	6	15	9	7	3030.3	613.50	0.26	791	468	933
15	10	6	15	11	5	3187.4	613.50	0.23	781	463	919
15	10	6	16	9	7	3059.6	613.50	0.03	789	467	931
15	10	6	16	11	5	3216.6	613.50	0.59	785	465	924
16	0	16	15	1	15	3077.9	237.75	4.22	697	433	848
16	0	16	16	1	15	3126.1	237.75	1.56	698	432	849
16	0	16	17	1	17	3134.1	237.75	4.63	696	431	847
16	1	16	15	0	15	3077.4	237.95	4.22	697	433	849

16	1	16	16	2	15	3128.9	237.95	1.49	701	433	852
16	1	16	17	0	17	3133.8	237.95	4.62	696	431	847
16	1	16	17	2	15	3172.0	237.95	0.13	700	431	847
16	2	14	15	1	15	3043.0	272.64	0.12	701	433	852
16	2	14	15	3	13	3088.2	272.64	0.93	710	435	862
16	2	14	16	1	15	3091.2	272.64	3.02	702	432	850
16	2	14	16	3	13	3120.2	272.64	3.32	708	434	856
16	2	14	17	3	15	3148.8	272.64	1.47	707	433	853
16	3	14	15	2	13	3061.8	285.29	1.25	709	435	860
16	3	14	16	2	15	3081.6	285.29	2.02	709	435	859
16	3	14	16	4	13	3132.7	285.29	2.24	720	438	869
16	3	14	17	2	15	3124.6	285.29	1.02	708	433	853
16	3	14	17	4	13	3164.4	285.29	1.25	717	437	863
16	4	12	15	3	13	3047.6	313.30	1.05	721	439	871
16	4	12	15	5	11	3110.4	313.30	0.45	737	444	887
16	4	12	16	3	13	3079.6	313.30	2.02	719	437	867
16	4	12	16	5	11	3139.9	313.30	1.88	733	442	882
16	4	12	17	5	13	3171.1	313.30	1.37	729	441	876
16	5	12	15	4	11	3040.5	348.20	1.09	735	444	885
16	5	12	16	4	13	3069.8	348.20	1.55	733	442	882
16	5	12	16	6	11	3148.1	348.20	1.49	747	448	894
16	5	12	17	4	13	3101.5	348.20	0.42	731	441	878
16	5	12	17	6	11	3179.3	348.20	1.33	742	446	889
16	6	10	15	5	11	3032.4	391.32	1.01	750	449	898
16	6	10	15	7	9	3126.7	391.32	0.22	767	455	913
16	6	10	16	5	11	3061.8	391.32	1.18	747	448	894
16	6	10	16	7	9	3156.0	391.32	1.14	760	453	906
16	6	10	17	7	11	3187.2	391.32	1.21	755	451	900
16	7	10	15	6	9	3024.5	442.39	0.88	765	455	911
16	7	10	16	6	11	3053.9	442.39	0.87	760	453	906
16	7	10	16	8	9	3163.9	442.39	0.83	772	458	916
16	7	10	17	6	11	3085.1	442.39	0.19	756	451	902
16	7	10	17	8	9	3195.0	442.39	1.05	766	456	910
16	8	8	15	7	9	3016.7	501.34	0.73	777	460	921
16	8	8	15	9	7	3142.5	501.34	0.08	785	465	930
16	8	8	16	7	9	3046.0	501.34	0.61	772	458	916
16	8	8	16	9	7	3171.8	501.34	0.58	780	462	923
16	8	8	17	9	9	3202.9	501.34	0.87	775	460	918
16	9	8	15	8	7	3008.9	568.14	0.58	784	464	927
16	9	8	16	8	9	3038.1	568.14	0.40	780	462	923
16	9	8	16	10	7	3179.6	568.14	0.38	784	465	926
16	9	8	17	8	9	3069.3	568.14	0.07	777	460	920
16	9	8	17	10	7	3210.7	568.14	0.68	780	463	922
16	10	6	15	9	7	3001.1	642.76	0.44	787	467	930
16	10	6	15	11	5	3158.1	642.76	0.02	781	463	920
16	10	6	16	9	7	3030.3	642.76	0.26	784	465	926
16	10	6	16	11	5	3187.4	642.76	0.24	783	465	923
16	10	6	17	11	7	3218.4	642.76	0.52	779	463	919
17	1	16	16	2	15	3077.0	289.81	2.11	702	432	849
17	1	16	17	0	17	3081.9	289.81	1.19	698	431	845
17	1	16	17	2	15	3120.1	289.81	2.77	701	431	844
17	1	16	18	2	17	3139.5	289.81	2.49	700	431	843
17	2	16	16	1	15	3071.5	292.27	2.17	701	432	849
17	2	16	17	1	17	3079.6	292.27	1.14	700	431	848

17	2	16	17	3	15	3129.1	292.27	2.06	707	433	853
17	2	16	18	1	17	3135.1	292.27	2.40	701	431	844
17	2	16	18	3	15	3166.8	292.27	0.51	705	431	845
17	3	14	16	2	15	3046.8	320.01	0.48	707	433	853
17	3	14	16	4	13	3098.0	320.01	0.55	718	436	864
17	3	14	17	2	15	3089.9	320.01	2.88	706	432	847
17	3	14	17	4	13	3129.7	320.01	2.17	715	435	858
17	3	14	18	4	15	3162.5	320.01	1.16	712	434	853
17	4	14	16	3	13	3048.5	344.40	0.97	716	436	862
17	4	14	17	3	15	3077.0	344.40	1.78	716	436	861
17	4	14	17	5	13	3140.0	344.40	1.74	727	439	873
17	4	14	18	3	15	3114.7	344.40	0.54	714	434	854
17	4	14	18	5	13	3173.2	344.40	1.20	723	438	866
17	5	12	16	4	13	3038.5	379.49	0.96	729	441	877
17	5	12	16	6	11	3116.8	379.49	0.32	744	446	890
17	5	12	17	4	13	3070.2	379.49	1.44	727	439	872
17	5	12	17	6	11	3148.0	379.49	1.39	739	444	885
17	5	12	18	6	13	3181.0	379.49	1.17	735	442	880
17	6	12	16	5	11	3030.6	422.53	0.89	742	446	889
17	6	12	17	5	13	3061.9	422.53	1.10	739	444	885
17	6	12	17	7	11	3156.0	422.53	1.07	751	449	896
17	6	12	18	5	13	3095.1	422.53	0.28	736	443	881
17	6	12	18	7	11	3189.0	422.53	1.06	746	447	891
17	7	10	16	6	11	3022.7	473.56	0.77	755	451	900
17	7	10	16	8	9	3132.7	473.56	0.14	768	456	913
17	7	10	17	6	11	3053.9	473.56	0.81	751	449	896
17	7	10	17	8	9	3163.9	473.56	0.79	762	454	906
17	7	10	18	8	11	3196.8	473.56	0.92	756	451	900
17	8	10	16	7	9	3014.9	532.48	0.64	766	456	910
17	8	10	17	7	11	3046.0	532.48	0.57	762	454	906
17	8	10	17	9	9	3171.7	532.48	0.55	771	458	914
17	8	10	18	7	11	3079.0	532.48	0.12	758	452	902
17	8	10	18	9	9	3204.7	532.48	0.76	766	456	909
17	9	8	16	8	9	3007.0	599.25	0.51	775	460	918
17	9	8	16	10	7	3148.5	599.25	0.05	781	463	923
17	9	8	17	8	9	3038.2	599.25	0.38	771	458	914
17	9	8	17	10	7	3179.5	599.25	0.37	777	461	918
17	9	8	18	10	9	3212.5	599.25	0.60	772	459	914
17	10	8	16	9	7	2999.2	673.85	0.39	780	463	921
17	10	8	17	9	9	3030.4	673.85	0.25	776	461	918
17	10	8	17	11	7	3187.3	673.85	0.23	776	462	916
17	10	8	18	9	9	3063.3	673.85	0.04	773	459	916
17	10	8	18	11	7	3220.2	673.85	0.45	774	461	915
18	0	18	17	1	17	3074.4	297.40	3.65	696	430	842
18	0	18	18	1	17	3129.9	297.40	1.16	697	430	839
18	0	18	19	1	19	3137.3	297.40	3.98	695	429	836
18	1	18	17	0	17	3074.2	297.50	3.65	696	430	842
18	1	18	18	2	17	3131.8	297.50	1.14	699	430	841
18	1	18	19	0	19	3137.1	297.50	3.97	695	429	836
18	1	18	19	2	17	3182.5	297.50	0.07	698	429	834
18	2	16	17	1	17	3032.8	339.09	0.07	699	430	842
18	2	16	17	3	15	3082.3	339.09	0.89	706	432	846
18	2	16	18	1	17	3088.2	339.09	2.13	700	429	836
18	2	16	18	3	15	3120.0	339.09	2.87	704	430	836

18	2	16	19	3	17	3150.1	339.09	1.27	703	430	835
18	3	16	17	2	15	3060.5	349.45	1.07	705	431	845
18	3	16	18	2	17	3079.9	349.45	1.59	705	431	845
18	3	16	18	4	15	3133.1	349.45	1.88	712	434	851
18	3	16	19	2	17	3130.5	349.45	0.98	704	430	835
18	3	16	19	4	15	3169.0	349.45	0.89	709	432	844
18	4	14	17	3	15	3043.2	378.17	0.76	713	434	854
18	4	14	17	5	13	3106.3	378.17	0.40	725	438	867
18	4	14	18	3	15	3080.9	378.17	1.77	711	433	847
18	4	14	18	5	13	3139.4	378.17	1.59	721	437	862
18	4	14	19	5	15	3174.4	378.17	1.04	718	435	856
18	5	14	17	4	13	3037.1	412.61	0.83	723	438	866
18	5	14	18	4	15	3069.9	412.61	1.32	721	437	862
18	5	14	18	6	13	3147.9	412.61	1.28	732	441	874
18	5	14	19	4	15	3105.9	412.61	0.37	719	436	857
18	5	14	19	6	13	3182.8	412.61	1.02	728	439	869
18	6	12	17	5	13	3028.8	455.59	0.77	735	442	880
18	6	12	17	7	11	3122.9	455.59	0.21	747	447	892
18	6	12	18	5	13	3062.0	455.59	1.01	732	441	875
18	6	12	18	7	11	3155.9	455.59	0.98	743	445	887
18	6	12	19	7	13	3190.8	455.59	0.92	739	443	881
18	7	12	17	6	11	3020.9	506.56	0.67	746	447	891
18	7	12	18	6	13	3054.0	506.56	0.75	743	445	887
18	7	12	18	8	11	3163.8	506.56	0.73	752	450	896
18	7	12	19	6	13	3088.9	506.56	0.18	740	444	882
18	7	12	19	8	11	3198.6	506.56	0.80	748	448	892
18	8	10	17	7	11	3013.1	565.45	0.56	756	451	900
18	8	10	17	9	9	3138.8	565.45	0.09	767	456	910
18	8	10	18	7	11	3046.1	565.45	0.53	752	450	896
18	8	10	18	9	9	3171.7	565.45	0.52	761	454	905
18	8	10	19	9	11	3206.5	565.45	0.66	756	452	900
18	9	10	17	8	9	3005.2	632.20	0.44	766	456	909
18	9	10	18	8	11	3038.2	632.20	0.36	761	454	905
18	9	10	18	10	9	3179.5	632.20	0.35	768	457	911
18	9	10	19	8	11	3073.0	632.20	0.07	758	452	901
18	9	10	19	10	9	3214.3	632.20	0.52	763	455	907
18	10	8	17	9	9	2997.4	706.77	0.33	772	459	914
18	10	8	17	11	7	3154.4	706.77	0.03	774	460	915
18	10	8	18	9	9	3030.4	706.77	0.23	768	457	911
18	10	8	18	11	7	3187.3	706.77	0.22	771	459	913
18	10	8	19	11	9	3222.0	706.77	0.39	766	457	909
19	1	18	18	2	17	3072.7	356.59	1.92	699	429	836
19	1	18	19	0	19	3078.0	356.59	0.86	696	429	831
19	1	18	19	2	17	3123.4	356.59	1.93	698	428	827
19	1	18	20	2	19	3142.0	356.59	2.19	697	428	826
19	2	18	18	1	17	3069.2	358.14	1.94	699	429	835
19	2	18	19	1	19	3076.6	358.14	0.84	697	429	834
19	2	18	19	3	17	3131.0	358.14	1.59	702	430	836
19	2	18	20	1	19	3139.2	358.14	2.14	697	428	827
19	2	18	20	3	17	3175.1	358.14	0.28	698	428	824
19	3	16	18	2	17	3039.1	390.21	0.27	702	430	836
19	3	16	18	4	15	3092.3	390.21	0.47	709	432	843
19	3	16	19	2	17	3089.8	390.21	2.37	699	428	825
19	3	16	19	4	15	3128.3	390.21	1.86	707	431	836

19	3	16	20	4	17	3164.3	390.21	0.87	704	430	830
19	4	16	18	3	15	3046.4	412.65	0.73	708	432	842
19	4	16	19	3	17	3076.5	412.65	1.44	708	431	841
19	4	16	19	5	15	3139.9	412.65	1.44	717	434	852
19	4	16	20	3	17	3120.6	412.65	0.47	704	430	830
19	4	16	20	5	15	3176.9	412.65	0.89	713	433	846
19	5	14	18	4	15	3034.9	447.66	0.71	718	435	857
19	5	14	18	6	13	3112.9	447.66	0.28	729	440	870
19	5	14	19	4	15	3070.8	447.66	1.20	717	434	851
19	5	14	19	6	13	3147.8	447.66	1.15	726	438	864
19	5	14	20	6	15	3184.6	447.66	0.87	722	436	858
19	6	14	18	5	13	3027.1	490.50	0.67	728	439	869
19	6	14	19	5	15	3062.1	490.50	0.91	726	438	864
19	6	14	19	7	13	3155.9	490.50	0.89	735	442	876
19	6	14	20	5	15	3099.0	490.50	0.24	723	437	859
19	6	14	20	7	13	3192.6	490.50	0.80	731	440	870
19	7	12	18	6	13	3019.1	541.42	0.58	739	443	881
19	7	12	18	8	11	3129.0	541.42	0.13	749	448	893
19	7	12	19	6	13	3054.0	541.42	0.68	735	442	876
19	7	12	19	8	11	3163.8	541.42	0.67	745	446	888
19	7	12	20	8	13	3200.4	541.42	0.69	741	444	883
19	8	12	18	7	11	3011.3	600.26	0.48	748	448	892
19	8	12	19	7	13	3046.1	600.26	0.48	745	446	888
19	8	12	19	9	11	3171.7	600.26	0.47	752	450	896
19	8	12	20	7	13	3082.8	600.26	0.11	742	444	884
19	8	12	20	9	11	3208.3	600.26	0.57	748	448	892
19	9	10	18	8	11	3003.4	666.98	0.38	756	452	900
19	9	10	18	10	9	3144.7	666.98	0.05	764	455	908
19	9	10	19	8	11	3038.2	666.98	0.33	752	450	896
19	9	10	19	10	9	3179.5	666.98	0.32	759	453	903
19	9	10	20	10	11	3216.1	666.98	0.45	755	451	899
19	10	10	18	9	9	2995.6	741.52	0.29	763	455	907
19	10	10	19	9	11	3030.4	741.52	0.22	759	453	903
19	10	10	19	11	9	3187.3	741.52	0.21	762	455	906
19	10	10	20	9	11	3067.0	741.52	0.04	756	451	900
19	10	10	20	11	9	3223.9	741.52	0.34	759	454	904
20	0	20	19	1	19	3071.1	363.63	3.01	694	428	828
20	0	20	20	1	19	3133.7	363.63	0.85	694	427	822
20	0	20	21	1	21	3140.6	363.63	3.26	692	427	818
20	1	20	19	0	19	3071.0	363.68	3.01	694	428	828
20	1	20	20	2	19	3134.9	363.68	0.84	695	428	824
20	1	20	21	0	21	3140.5	363.68	3.25	692	427	819
20	1	20	21	2	19	3193.4	363.68	0.04	693	426	814
20	2	18	19	1	19	3022.0	412.71	0.04	696	427	825
20	2	18	19	3	17	3076.5	412.71	0.82	700	428	826
20	2	18	20	1	19	3084.6	412.71	1.42	695	427	817
20	2	18	20	3	17	3120.5	412.71	2.25	695	427	812
20	2	18	21	3	19	3151.3	412.71	1.08	695	427	811
20	3	18	19	2	17	3059.2	420.76	0.91	699	428	824
20	3	18	20	2	19	3077.8	420.76	1.18	699	428	825
20	3	18	20	4	17	3133.7	420.76	1.48	704	429	830
20	3	18	21	2	19	3136.3	420.76	0.92	696	427	813
20	3	18	21	4	17	3174.3	420.76	0.58	700	428	820
20	4	16	19	3	17	3038.4	450.80	0.51	705	430	834

20	4	16	19	5	15	3101.7	450.80	0.33	714	433	845
20	4	16	20	3	17	3082.4	450.80	1.50	701	428	821
20	4	16	20	5	15	3138.7	450.80	1.29	711	432	839
20	4	16	21	5	17	3177.3	450.80	0.76	707	430	832
20	5	16	19	4	15	3034.0	484.46	0.61	713	433	845
20	5	16	20	4	17	3070.0	484.46	1.06	712	432	841
20	5	16	20	6	15	3147.8	484.46	1.03	720	435	853
20	5	16	21	4	17	3110.6	484.46	0.30	708	430	832
20	5	16	21	6	15	3186.4	484.46	0.75	717	434	847
20	6	14	19	5	15	3025.3	527.27	0.57	722	436	858
20	6	14	19	7	13	3119.1	527.27	0.18	733	440	872
20	6	14	20	5	15	3062.2	527.27	0.82	720	435	853
20	6	14	20	7	13	3155.8	527.27	0.80	729	439	865
20	6	14	21	7	15	3194.3	527.27	0.68	725	437	859
20	7	14	19	6	13	3017.3	578.11	0.49	731	440	870
20	7	14	20	6	15	3054.1	578.11	0.61	729	439	865
20	7	14	20	8	13	3163.7	578.11	0.60	738	442	878
20	7	14	21	6	15	3092.7	578.11	0.15	726	437	860
20	7	14	21	8	13	3202.2	578.11	0.59	734	440	872
20	8	12	19	7	13	3009.5	636.91	0.41	741	444	883
20	8	12	19	9	11	3135.0	636.91	0.08	750	448	893
20	8	12	20	7	13	3046.2	636.91	0.43	738	442	878
20	8	12	20	9	11	3171.6	636.91	0.43	746	446	888
20	8	12	21	9	13	3210.1	636.91	0.48	742	444	883
20	9	12	19	8	11	3001.6	703.59	0.32	748	448	892
20	9	12	20	8	13	3038.3	703.59	0.30	746	446	888
20	9	12	20	10	11	3179.5	703.59	0.29	752	449	895
20	9	12	21	8	13	3076.8	703.59	0.06	743	444	884
20	9	12	21	10	11	3217.9	703.59	0.38	748	447	891
20	10	10	19	9	11	2993.8	778.11	0.24	755	451	899
20	10	10	19	11	9	3150.7	778.11	0.03	760	454	904
20	10	10	20	9	11	3030.4	778.11	0.20	752	449	896
20	10	10	20	11	9	3187.3	778.11	0.19	756	452	901
20	10	10	21	11	11	3225.7	778.11	0.29	752	450	897

VII. APPENDIX C

LISTING OF LINEWIDTHS FOR TYPE C BAND

The format of this listing is also the same as that used for the tabulation in the Appendix A. The line position and the relative line intensity values refer to the ν_7 fundamental band of ethylene. All other spectral parameters listed can be applied to any type C vibrational-rotational band of C_2H_4 .

Listing of Linewidth Parameters for Type C Band of C_2H_4

Lower State			Upper State			Approximate Line Position in the ν_7 Band (cm^{-1})	Rotational Energy of the Lower State (cm^{-1})	Relative Line Intensity (ν_7 Band) at 300°K	γ^0 (in $10^{-4} cm^{-1} atm^{-1}$) of C_2H_4 Lines Broadened by			
J	K_a	K_c	J	K_a	K_c				C_2H_4	N_2	O_2	Air
									300°K	300°K	200°K	
0	0	0	1	1	0	955.2	0.0	1.00	1628	815	471	1004
1	1	1	1	0	1	945.4	5.69	1.44	1634	798	464	987
1	1	1	2	2	1	964.9	5.69	1.47	1628	798	464	985
2	0	2	2	1	2	953.0	5.48	2.47	1638	814	468	1004
2	0	2	3	1	2	959.3	5.48	1.93	1628	800	462	984
2	1	1	1	0	1	941.4	9.70	1.40	1635	805	465	993
2	1	1	2	2	1	960.9	9.70	0.80	1629	836	478	1027
2	1	1	3	2	1	966.4	9.70	1.71	1629	829	474	1018
2	2	0	1	1	0	933.9	21.30	1.35	1629	797	464	984
2	2	0	3	3	0	974.5	21.30	2.31	1625	760	449	939
3	1	3	3	0	3	945.8	14.41	3.39	1627	808	464	990
3	1	3	4	2	3	969.0	14.41	1.76	1623	823	471	1007
3	2	2	2	1	2	931.7	26.78	1.42	1633	828	474	1018
3	2	2	3	1	2	938.0	26.78	1.27	1624	833	476	1020
3	2	2	4	3	2	976.4	26.78	2.39	1628	831	475	1018
3	3	1	2	2	1	924.1	46.53	1.93	1625	760	449	939
3	3	1	3	2	1	929.6	46.53	0.66	1625	825	474	1012
3	3	1	4	4	1	984.3	46.53	2.89	1622	731	438	900
4	0	4	4	1	4	952.5	18.21	4.49	1602	806	464	976
4	0	4	5	1	4	963.7	18.21	2.58	1574	798	462	957
4	1	3	3	0	3	937.2	23.10	2.11	1607	801	462	973
4	1	3	4	2	3	960.3	23.10	1.89	1603	825	473	1001
4	1	3	5	2	3	969.6	23.10	2.27	1585	816	469	984
4	2	2	3	1	2	930.6	34.18	1.73	1615	824	472	1005
4	2	2	4	3	2	969.0	34.18	1.31	1620	839	479	1025
4	2	2	5	3	2	978.2	34.18	2.50	1611	835	477	1016
4	3	1	3	2	1	922.2	53.86	1.98	1627	831	475	1018
4	3	1	4	4	1	976.9	53.86	0.69	1625	805	466	989
4	3	1	5	4	1	986.1	53.86	2.89	1629	824	472	1009
4	4	0	3	3	0	914.3	81.49	2.26	1622	731	438	900

4	4	0	5	5	0	994.0	81.49	3.17	1620	704	431	870
5	1	5	5	0	5	946.5	30.06	5.39	1565	801	463	956
5	1	5	6	2	5	973.4	30.06	1.99	1557	807	466	965
5	2	4	4	1	4	927.4	43.23	1.62	1597	817	469	989
5	2	4	5	1	4	938.7	43.23	2.18	1568	815	469	976
5	2	4	6	3	4	980.1	43.23	2.59	1580	828	475	998
5	3	3	4	2	3	920.4	63.03	2.04	1613	836	477	1018
5	3	3	5	2	3	929.7	63.03	1.51	1596	834	478	1011
5	3	3	6	4	3	987.9	63.03	2.91	1609	838	479	1021
5	4	2	4	3	2	912.5	90.65	2.24	1629	824	472	1009
5	4	2	5	3	2	921.7	90.65	0.99	1620	838	478	1023
5	4	2	6	5	2	995.8	90.65	3.11	1627	813	467	997
5	5	1	4	4	1	904.6	126.16	2.32	1620	704	431	870
5	5	1	5	4	1	913.8	126.16	0.46	1624	786	458	966
5	5	1	6	6	1	1003.7	126.16	3.16	1616	683	425	845
6	0	6	6	1	6	951.7	38.03	6.47		788	461	933
6	0	6	7	1	6	968.7	38.03	2.83		775	458	913
6	1	5	5	0	5	932.4	44.10	2.45		789	461	936
6	1	5	6	2	5	959.4	44.10	2.77		799	466	949
6	1	5	7	2	5	972.8	44.10	2.88		787	463	933
6	2	4	5	1	4	927.4	54.57	2.21		805	466	958
6	2	4	6	3	4	968.8	54.57	2.06		822	474	986
6	2	4	7	3	4	981.6	54.57	2.70		812	471	970
6	3	3	5	2	3	918.7	74.04	2.10		827	475	997
6	3	3	6	4	3	976.9	74.04	1.60		838	480	1017
6	3	3	7	4	3	989.7	74.04	2.93		833	478	1005
6	4	2	5	3	2	910.7	101.65	2.22		838	479	1021
6	4	2	6	5	2	984.8	101.65	1.05		832	476	1017
6	4	2	7	5	2	997.6	101.65	3.06		836	478	1018
6	5	1	5	4	1	902.8	137.15	2.25		813	467	997
6	5	1	6	6	1	992.7	137.15	0.49		769	451	947
6	5	1	7	6	1	1005.5	137.15	3.05		802	463	983
6	6	0	5	5	0	894.9	180.53	2.16		683	425	845
6	6	0	7	7	0	1013.4	180.53	2.90		665	421	824
7	1	7	7	0	7	947.2	52.61	7.29		774	458	909
7	1	7	8	2	7	978.2	52.61	2.07		776	459	915
7	2	6	6	1	6	922.8	66.94	1.70		792	463	940
7	2	6	7	1	6	939.8	66.94	2.95		782	462	924
7	2	6	8	3	6	983.9	66.94	2.72		794	466	947
7	3	5	6	2	5	916.6	86.88	2.12		813	471	971
7	3	5	7	2	5	930.1	86.88	2.01		804	469	960
7	3	5	8	4	5	991.6	86.88	2.92		819	474	981
7	4	4	6	3	4	908.9	114.48	2.20		833	478	1005
7	4	4	7	3	4	921.7	114.48	1.56		828	477	995
7	4	4	8	5	4	999.5	114.48	3.00		835	479	1007
7	5	3	6	4	3	901.0	149.97	2.18		836	478	1018
7	5	3	7	4	3	913.8	149.97	1.08		838	480	1017
7	5	3	8	6	3	1007.3	149.97	2.95		833	476	1010
7	6	2	6	5	2	893.1	193.35	2.06		802	463	983
7	6	2	7	5	2	905.9	193.35	0.63		825	472	1005
7	6	2	8	7	2	1015.2	193.35	2.77		791	458	966
7	7	1	6	6	1	885.2	244.58	1.85		665	421	823
7	7	1	7	6	1	898.1	244.58	0.26		754	445	925
7	7	1	8	8	1	1023.0	244.58	2.49		650	417	802

8	0	8	8	1	8	951.0	64.74	8.22	756	454	888
8	0	8	9	1	8	974.2	64.74	2.69	744	451	876
8	1	7	7	0	7	927.2	72.63	2.40	760	454	892
8	1	7	8	2	7	958.2	72.63	3.51	763	456	901
8	1	7	9	2	7	976.2	72.63	3.36	752	453	888
8	2	6	7	1	6	924.1	82.63	2.64	769	458	908
8	2	6	8	3	6	968.2	82.63	2.47	784	464	936
8	2	6	9	3	6	984.9	82.63	2.82	774	460	922
8	3	5	7	2	5	915.3	101.62	2.18	793	466	946
8	3	5	8	4	5	976.8	101.62	2.11	810	472	971
8	3	5	9	4	5	993.3	101.62	2.89	800	469	959
8	4	4	7	3	4	907.1	129.15	2.17	818	474	981
8	4	4	8	5	4	984.8	129.15	1.64	831	479	999
8	4	4	9	5	4	1001.3	129.15	2.92	823	477	987
8	5	3	7	4	3	899.1	164.63	2.11	835	479	1007
8	5	3	8	6	3	992.7	164.63	1.13	836	479	1010
8	5	3	9	6	3	1009.1	164.63	2.84	834	479	1004
8	6	2	7	5	2	891.3	208.00	1.96	833	476	1010
8	6	2	8	7	2	1000.5	208.00	0.67	816	468	990
8	6	2	9	7	2	1017.0	208.00	2.64	826	473	997
8	7	1	7	6	1	883.4	259.23	1.75	791	458	966
8	7	1	8	8	1	1008.4	259.23	0.28	740	440	903
8	7	1	9	8	1	1024.8	259.23	2.35	778	453	945
8	8	0	7	7	0	875.6	318.30	1.48	648	417	800
8	8	0	9	9	0	1032.7	318.30	2.00	630	413	776
9	1	9	9	0	9	947.9	82.00	8.81	743	450	873
9	1	9	10	2	9	983.3	82.00	2.00	744	450	879
9	2	8	8	1	8	917.9	97.87	1.64	757	455	894
9	2	8	9	1	8	941.1	97.87	3.61	747	452	884
9	2	8	10	3	8	987.9	97.87	2.72	759	455	903
9	3	7	8	2	7	912.7	118.09	2.12	776	460	922
9	3	7	9	2	7	930.8	118.09	2.26	767	458	913
9	3	7	10	4	7	995.2	118.09	2.84	783	463	937
9	4	6	8	3	6	905.2	145.66	2.12	800	469	959
9	4	6	9	3	6	921.8	145.66	1.85	792	467	950
9	4	6	10	5	6	1003.1	145.66	2.83	806	472	967
9	5	5	8	4	5	897.3	181.12	2.03	823	477	987
9	5	5	9	4	5	913.8	181.12	1.41	816	474	978
9	5	5	10	6	5	1011.0	181.12	2.72	825	477	987
9	6	4	8	5	4	889.5	224.48	1.87	834	479	1004
9	6	4	9	5	4	905.9	224.48	0.98	832	479	997
9	6	4	10	7	4	1018.8	224.48	2.50	831	478	995
9	7	3	8	6	3	881.6	275.70	1.64	826	473	997
9	7	3	9	6	3	898.1	275.70	0.61	832	477	999
9	7	3	10	8	3	1026.7	275.70	2.21	816	470	980
9	8	2	8	7	2	873.8	334.77	1.38	778	452	944
9	8	2	9	7	2	890.2	334.77	0.32	803	463	969
9	8	2	10	9	2	1034.5	334.77	1.87	760	446	917
9	9	1	8	8	1	865.9	401.67	1.11	650	417	798
9	9	1	9	8	1	882.4	401.67	0.12	704	429	856
9	9	1	10	10	1	1042.3	401.67	1.51	606	409	742
10	0	10	10	1	10	950.4	98.15	9.41	728	446	862
10	0	10	11	1	10	980.4	98.15	2.31	719	443	859
10	1	9	9	0	9	921.4	108.56	2.07	731	446	865

10	1	9	10	2	9	956.8	108.56	4.10	732	447	873
10	1	9	11	2	9	980.1	108.56	3.53	723	444	867
10	2	8	9	1	8	920.5	118.48	2.85	736	448	875
10	2	8	10	3	8	967.3	118.48	2.62	751	452	897
10	2	8	11	3	8	987.8	118.48	2.86	743	449	889
10	3	7	9	2	7	912.2	136.66	2.20	757	455	902
10	3	7	10	4	7	976.7	136.66	2.31	775	461	929
10	3	7	11	4	7	996.9	136.66	2.77	768	458	918
10	4	6	9	3	6	903.5	164.02	2.06	782	463	938
10	4	6	10	5	6	984.7	164.02	1.92	798	469	959
10	4	6	11	5	6	1004.9	164.02	2.72	790	466	947
10	5	5	9	4	5	895.5	199.46	1.94	806	472	967
10	5	5	10	6	5	992.6	199.46	1.47	818	475	980
10	5	5	11	6	5	1012.8	199.46	2.58	810	473	969
10	6	4	9	5	4	887.6	242.79	1.76	825	477	987
10	6	4	10	7	4	1000.5	242.79	1.03	829	478	990
10	6	4	11	7	4	1020.7	242.79	2.36	823	477	982
10	7	3	9	6	3	879.8	294.01	1.54	831	478	995
10	7	3	10	8	3	1008.4	294.01	0.65	823	474	984
10	7	3	11	8	3	1028.5	294.01	2.06	824	475	982
10	8	2	9	7	2	871.9	353.07	1.28	816	470	980
10	8	2	10	9	2	1016.2	353.07	0.35	785	456	942
10	8	2	11	9	2	1036.3	353.07	1.73	802	464	957
10	9	1	9	8	1	864.1	419.96	1.03	757	445	913
10	9	1	10	10	1	1024.0	419.96	0.13	680	424	823
10	9	1	11	10	1	1044.1	419.96	1.40	737	440	886
10	10	0	9	9	0	856.3	494.66	0.79	732	440	892
10	10	0	11	11	0	1051.9	494.66	1.08	587	407	718
11	1	11	11	0	11	948.5	118.17	9.67	716	443	856
11	1	11	12	2	11	988.8	118.17	1.80	717	443	863
11	2	10	10	1	10	912.6	135.94	1.48	728	446	869
11	2	10	11	1	10	942.6	135.94	4.13	720	443	867
11	2	10	12	3	10	992.1	135.94	2.57	732	446	880
11	3	9	10	2	9	908.6	156.69	2.00	745	450	889
11	3	9	11	2	9	932.0	156.69	2.33	738	448	886
11	3	9	12	4	9	998.9	156.69	2.66	755	453	904
11	4	8	10	3	8	901.5	184.22	1.98	768	458	918
11	4	8	11	3	8	922.1	184.22	1.91	762	455	912
11	4	8	12	5	8	1006.7	184.22	2.59	776	460	928
11	5	7	10	4	7	893.7	219.63	1.84	790	466	947
11	5	7	11	4	7	913.9	219.63	1.53	783	463	939
11	5	7	12	6	7	1014.6	219.63	2.44	795	468	951
11	6	6	10	5	6	885.8	262.95	1.65	810	473	969
11	6	6	11	5	6	906.0	262.95	1.14	803	470	962
11	6	6	12	7	6	1022.5	262.95	2.21	811	473	966
11	7	5	10	6	5	877.9	314.15	1.43	823	477	982
11	7	5	11	6	5	898.1	314.15	0.78	818	476	975
11	7	5	12	8	5	1030.3	314.15	1.92	818	476	971
11	8	4	10	7	4	870.1	373.20	1.18	824	475	982
11	8	4	11	7	4	890.2	373.20	0.50	823	476	978
11	8	4	12	9	4	1038.1	373.20	1.60	813	472	964
11	9	3	10	8	3	862.3	440.08	0.94	803	465	959
11	9	3	11	8	3	882.4	440.08	0.28	811	469	964
11	9	3	12	10	3	1045.9	440.08	1.28	777	455	923

11	10	2	10	9	2	854.5	514.77	0.72	722	435	867
11	10	2	11	9	2	874.6	514.77	0.14	751	445	895
11	10	2	12	11	2	1053.7	514.77	0.99	747	445	901
12	0	12	12	1	12	949.9	138.13	9.85	708	439	853
12	0	12	13	1	12	987.1	138.13	1.87	705	437	854
12	1	11	11	0	11	914.9	151.72	1.64	710	440	855
12	1	11	12	2	11	955.2	151.72	4.51	712	440	863
12	1	11	13	2	11	984.5	151.72	3.32	708	438	860
12	2	10	11	1	10	916.4	162.16	2.75	714	441	863
12	2	10	12	3	10	965.9	162.16	2.60	727	444	879
12	2	10	13	3	10	990.6	162.16	2.82	722	442	874
12	3	9	11	2	9	909.4	179.29	2.16	730	445	880
12	3	9	12	4	9	976.3	179.29	2.27	749	451	900
12	3	9	13	4	9	1000.2	179.29	2.55	742	448	894
12	4	8	11	3	8	900.0	206.31	1.89	754	452	904
12	4	8	12	5	8	984.6	206.31	1.96	771	458	922
12	4	8	13	5	8	1008.5	206.31	2.44	764	455	914
12	5	7	11	4	7	891.9	241.65	1.73	776	460	928
12	5	7	12	6	7	992.6	241.65	1.57	789	465	942
12	5	7	13	6	7	1016.4	241.65	2.28	782	462	933
12	6	6	11	5	6	884.0	284.94	1.54	795	468	951
12	6	6	12	7	6	1000.5	284.94	1.17	804	471	958
12	6	6	13	7	6	1024.3	284.94	2.05	797	469	949
12	7	5	11	6	5	876.1	336.12	1.32	811	473	966
12	7	5	12	8	5	1008.3	336.12	0.82	814	475	966
12	7	5	13	8	5	1032.1	336.12	1.77	808	473	958
12	8	4	11	7	4	868.3	395.16	1.09	818	476	972
12	8	4	12	9	4	1016.2	395.16	0.52	813	473	963
12	8	4	13	9	4	1040.0	395.16	1.47	810	473	958
12	9	3	11	8	3	860.5	462.03	0.86	813	472	964
12	9	3	12	10	3	1024.0	462.03	0.30	785	460	930
12	9	3	13	10	3	1047.7	462.03	1.17	798	467	944
12	10	2	11	9	2	852.7	536.71	0.65	784	458	931
12	10	2	12	11	2	1031.8	536.71	0.15	745	444	889
12	10	2	13	11	2	1055.5	536.71	0.90	739	442	877
13	1	13	13	0	13	948.8	161.07	9.75	702	437	851
13	1	13	14	2	13	994.5	161.07	1.54	704	437	857
13	2	12	12	1	12	907.0	181.09	1.25	709	439	859
13	2	12	13	1	12	944.2	181.09	4.48	707	438	860
13	2	12	14	3	12	996.6	181.09	2.30	716	440	869
13	3	11	12	2	11	904.3	202.64	1.79	722	443	874
13	3	11	13	2	11	933.6	202.64	2.28	719	441	873
13	3	11	14	4	11	1002.6	202.64	2.39	733	445	886
13	4	10	12	3	10	897.9	230.19	1.77	742	448	894
13	4	10	13	3	10	922.6	230.19	1.81	738	446	891
13	4	10	14	5	10	1010.3	230.19	2.29	752	451	902
13	5	9	12	4	9	890.1	265.51	1.61	764	455	914
13	5	9	13	4	9	914.0	265.51	1.49	759	453	909
13	5	9	14	6	9	1018.2	265.51	2.12	771	458	919
13	6	8	12	5	8	882.2	308.77	1.42	782	462	933
13	6	8	13	5	8	906.0	308.77	1.15	777	460	927
13	6	8	14	7	8	1026.1	308.77	1.89	786	464	934
13	7	7	12	6	7	874.3	359.93	1.21	797	469	949
13	7	7	13	6	7	898.1	359.93	0.83	792	466	942

13	7	7	14	8	7	1033.9	359.93	1.62	796	469	944
13	8	6	12	7	6	866.5	418.95	0.99	808	473	958
13	8	6	13	7	6	890.3	418.95	0.56	803	471	952
13	8	6	14	9	6	1041.8	418.95	1.34	803	472	948
13	9	5	12	8	5	858.6	485.81	0.78	811	473	959
13	9	5	13	8	5	882.4	485.81	0.35	808	473	955
13	9	5	14	10	5	1049.6	485.81	1.07	798	469	941
13	10	4	12	9	4	850.9	560.47	0.59	796	466	941
13	10	4	13	9	4	874.6	560.47	0.20	797	467	940
13	10	4	14	11	4	1057.3	560.47	0.81	777	459	917
14	0	14	14	1	14	949.7	184.67	9.56	699	435	851
14	0	14	15	1	14	994.2	184.67	1.48	700	434	852
14	1	13	13	0	13	908.0	201.90	1.25	701	436	853
14	1	13	14	2	13	953.7	201.90	4.71	704	436	858
14	1	13	15	2	13	989.6	201.90	2.82	703	434	856
14	2	12	13	1	12	911.7	213.60	2.38	705	436	858
14	2	12	14	3	12	964.1	213.60	2.48	714	438	868
14	2	12	15	3	12	993.5	213.60	2.68	711	436	864
14	3	11	13	2	11	906.6	229.66	2.05	715	439	869
14	3	11	14	4	11	975.6	229.66	2.06	730	443	883
14	3	11	15	4	11	1003.4	229.66	2.26	726	441	878
14	4	10	13	3	10	896.8	256.04	1.67	733	444	886
14	4	10	14	5	10	984.5	256.04	1.83	748	449	899
14	4	10	15	5	10	1012.1	256.04	2.12	743	447	894
14	5	9	13	4	9	888.3	291.23	1.49	752	451	902
14	5	9	14	6	9	992.5	291.23	1.51	767	456	914
14	5	9	15	6	9	1020.0	291.23	1.95	760	453	908
14	6	8	13	5	8	880.4	334.45	1.30	771	458	919
14	6	8	14	7	8	1000.4	334.45	1.17	781	462	928
14	6	8	15	7	8	1027.9	334.45	1.73	775	459	921
14	7	7	13	6	7	872.5	385.58	1.10	786	464	934
14	7	7	14	8	7	1008.3	385.58	0.85	791	467	938
14	7	7	15	8	7	1035.8	385.58	1.48	785	464	931
14	8	6	13	7	6	864.7	444.58	0.90	796	469	944
14	8	6	14	9	6	1016.1	444.58	0.58	798	470	944
14	8	6	15	9	6	1043.6	444.58	1.21	792	468	937
14	9	5	13	8	5	856.8	511.42	0.70	802	471	948
14	9	5	14	10	5	1024.0	511.42	0.37	796	469	938
14	9	5	15	10	5	1051.4	511.42	0.96	794	469	936
14	10	4	13	9	4	849.0	586.07	0.53	800	470	943
14	10	4	14	11	4	1031.7	586.07	0.22	779	461	918
14	10	4	15	11	4	1059.2	586.07	0.73	778	461	915
15	1	15	15	0	15	949.0	210.66	9.17	698	433	849
15	1	15	16	2	15	1000.5	210.66	1.26	701	433	853
15	2	14	14	1	14	901.1	233.23	1.00	702	435	855
15	2	14	15	1	14	945.6	233.23	4.59	703	434	857
15	2	14	16	3	14	1001.4	233.23	1.95	709	435	861
15	3	13	14	2	13	899.7	255.92	1.50	711	437	865
15	3	13	15	2	13	935.6	255.92	2.17	711	436	864
15	3	13	16	4	13	1006.4	255.92	2.06	721	439	872
15	4	12	14	3	12	894.1	283.58	1.52	726	442	878
15	4	12	15	3	12	923.5	283.58	1.60	724	440	876
15	4	12	16	5	12	1013.9	283.58	1.94	735	444	885
15	5	11	14	4	11	886.5	318.79	1.36	742	447	893

15	5	11	15	4	11	914.2	318.79	1.34	740	446	890
15	5	11	16	6	11	1021.8	318.79	1.77	750	449	898
15	6	10	14	5	10	878.6	361.96	1.18	760	453	908
15	6	10	15	5	10	906.1	361.96	1.06	755	451	904
15	6	10	16	7	10	1029.7	361.96	1.57	765	455	910
15	7	9	14	6	9	870.7	413.06	1.00	775	459	921
15	7	9	15	6	9	898.2	413.06	0.78	770	457	917
15	7	9	16	8	9	1037.6	413.06	1.33	776	460	920
15	8	8	14	7	8	862.8	472.04	0.81	785	464	931
15	8	8	15	7	8	890.3	472.04	0.55	781	462	927
15	8	8	16	9	8	1045.4	472.04	1.09	783	464	927
15	9	7	14	8	7	855.0	538.86	0.63	793	468	937
15	9	7	15	8	7	882.5	538.86	0.36	788	466	933
15	9	7	16	10	7	1053.2	538.86	0.86	786	466	928
15	10	6	14	9	6	847.2	613.50	0.47	793	469	935
15	10	6	15	9	6	874.7	613.50	0.22	790	467	932
15	10	6	16	11	6	1061.0	613.50	0.65	783	464	921
16	0	16	16	1	16	949.5	237.75	8.71	697	432	848
16	0	16	17	1	16	1001.4	237.75	1.14	698	431	847
16	1	15	15	0	15	900.8	258.86	0.93	699	433	850
16	1	15	16	2	15	952.3	258.86	4.63	702	433	853
16	1	15	17	2	15	995.4	258.86	2.19	701	431	846
16	2	14	15	1	14	906.2	272.64	1.85	702	432	853
16	2	14	16	3	14	961.9	272.64	2.30	709	434	857
16	2	14	17	3	14	996.7	272.64	2.41	707	432	851
16	3	13	15	2	13	903.6	287.90	1.86	709	434	859
16	3	13	16	4	13	974.5	287.90	1.75	719	437	868
16	3	13	17	4	13	1006.2	287.90	1.94	716	436	862
16	4	12	15	3	12	893.8	313.30	1.42	721	439	871
16	4	12	16	5	12	984.2	313.30	1.58	733	442	881
16	4	12	17	5	12	1015.5	313.30	1.77	729	441	876
16	5	11	15	4	11	884.8	348.21	1.24	735	444	885
16	5	11	16	6	11	992.4	348.21	1.34	746	448	894
16	5	11	17	6	11	1023.6	348.21	1.60	741	446	889
16	6	10	15	5	10	876.8	391.32	1.07	750	449	898
16	6	10	16	7	10	1000.4	391.32	1.06	760	453	905
16	6	10	17	7	10	1031.5	391.32	1.41	754	451	900
16	7	9	15	6	9	868.9	442.39	0.89	765	455	910
16	7	9	16	8	9	1008.3	442.39	0.79	772	458	916
16	7	9	17	8	9	1039.4	442.39	1.19	766	455	910
16	8	8	15	7	8	861.0	501.34	0.72	776	460	920
16	8	8	16	9	8	1016.1	501.34	0.56	780	462	923
16	8	8	17	9	8	1047.2	501.34	0.97	775	460	917
16	9	7	15	8	7	853.2	568.14	0.56	783	464	927
16	9	7	16	10	7	1023.9	568.14	0.37	783	464	925
16	9	7	17	10	7	1055.0	568.14	0.76	780	463	921
16	10	6	15	9	6	845.4	642.76	0.41	787	466	929
16	10	6	16	11	6	1031.7	642.76	0.24	781	463	920
16	10	6	17	11	6	1062.8	642.76	0.58	777	462	916
17	1	17	17	0	17	949.2	266.90	8.13	696	431	845
17	1	17	18	2	17	1006.8	266.90	0.98	699	431	844
17	2	16	16	1	16	895.0	292.27	0.76	700	432	850
17	2	16	17	1	16	946.8	292.27	4.41	702	431	847
17	2	16	18	3	16	1006.5	292.27	1.56	706	432	848

17	3	15	16	2	15	894.7	316.47	1.20	707	434	855
17	3	15	17	2	15	937.8	316.47	2.02	707	432	850
17	3	15	18	4	15	1010.4	316.47	1.69	713	434	856
17	4	14	16	3	14	890.2	344.40	1.24	717	436	864
17	4	14	17	3	14	924.9	344.40	1.34	715	435	858
17	4	14	18	5	14	1017.5	344.40	1.59	723	438	866
17	5	13	16	4	13	882.9	379.48	1.11	729	441	877
17	5	13	17	4	13	914.6	379.48	1.13	727	439	872
17	5	13	18	6	13	1025.4	379.48	1.43	735	442	879
17	6	12	16	5	12	875.0	422.53	0.95	742	446	889
17	6	12	17	5	12	906.3	422.53	0.91	739	444	885
17	6	12	18	7	12	1033.3	422.53	1.25	746	447	891
17	7	11	16	6	11	867.1	473.56	0.79	754	451	900
17	7	11	17	6	11	898.3	473.56	0.69	750	449	896
17	7	11	18	8	11	1041.2	473.56	1.06	756	451	900
17	8	10	16	7	10	859.2	532.48	0.63	766	455	910
17	8	10	17	7	10	890.4	532.48	0.49	762	454	906
17	8	10	18	9	10	1049.0	532.48	0.86	765	455	909
17	9	9	16	8	9	851.4	599.25	0.49	775	460	918
17	9	9	17	8	9	882.5	599.25	0.33	770	458	913
17	9	9	18	10	9	1056.8	599.25	0.67	771	459	914
17	10	8	16	9	8	843.6	673.85	0.36	779	462	921
17	10	8	17	9	8	874.7	673.85	0.21	776	461	917
17	10	8	18	11	8	1064.6	673.85	0.51	773	460	914
18	0	18	18	1	18	949.4	297.40	7.51	696	430	839
18	0	18	19	1	18	1008.5	297.40	0.86	696	429	835
18	1	17	17	0	17	893.7	322.39	0.67	698	430	841
18	1	17	18	2	17	951.3	322.39	4.27	700	430	841
18	1	17	19	2	17	1001.9	322.39	1.60	698	429	830
18	2	16	17	1	16	900.0	339.09	1.33	700	430	840
18	2	16	18	3	16	959.7	339.09	2.08	705	431	840
18	2	16	19	3	16	1000.4	339.09	2.00	701	429	830
18	3	15	17	2	15	900.1	354.12	1.57	704	431	841
18	3	15	18	4	15	972.8	354.12	1.42	711	433	848
18	3	15	19	4	15	1008.7	354.12	1.61	708	431	840
18	4	14	17	3	14	891.1	378.17	1.18	712	434	852
18	4	14	18	5	14	983.7	378.17	1.29	721	437	861
18	4	14	19	5	14	1018.8	378.17	1.42	718	435	856
18	5	13	17	4	13	881.4	412.64	0.99	723	438	866
18	5	13	18	6	13	992.2	412.64	1.11	732	441	874
18	5	13	19	6	13	1027.2	412.64	1.27	728	439	868
18	6	12	17	5	12	873.2	455.59	0.84	735	442	879
18	6	12	18	7	12	1000.3	455.59	0.90	743	445	886
18	6	12	19	7	12	1035.1	455.59	1.11	738	443	881
18	7	11	17	6	11	865.3	506.56	0.69	746	447	891
18	7	11	18	8	11	1008.2	506.56	0.68	752	450	896
18	7	11	19	8	11	1043.0	506.56	0.93	747	447	892
18	8	10	17	7	10	857.4	565.45	0.55	756	451	900
18	8	10	18	9	10	1016.0	565.45	0.49	761	454	904
18	8	10	19	9	10	1050.8	565.45	0.75	756	451	899
18	9	9	17	8	9	849.6	632.20	0.43	765	455	908
18	9	9	18	10	9	1023.9	632.20	0.34	767	457	910
18	9	9	19	10	9	1058.6	632.20	0.59	762	455	906
18	10	8	17	9	8	841.8	706.77	0.32	771	459	914

18	10	8	18	11	8	1031.7	706.77	0.22	770	458	912
18	10	8	19	11	8	1066.4	706.77	0.44	765	456	908
19	1	19	19	0	19	949.2	329.76	6.84	695	429	833
19	1	19	20	2	19	1013.1	329.76	0.74	696	428	829
19	2	18	18	1	18	888.7	358.14	0.56	698	429	838
19	2	18	19	1	18	947.8	358.14	3.96	699	429	832
19	2	18	20	3	18	1011.9	358.14	1.20	700	429	831
19	3	17	18	2	17	889.4	384.21	0.90	703	430	840
19	3	17	19	2	17	940.1	384.21	1.84	701	429	830
19	3	17	20	4	17	1014.6	384.21	1.33	706	430	835
19	4	16	18	3	16	886.1	412.65	0.97	710	432	846
19	4	16	19	3	16	926.9	412.65	1.08	707	431	837
19	4	16	20	5	16	1021.1	412.65	1.25	713	433	846
19	5	15	18	4	15	879.3	447.60	0.87	718	435	857
19	5	15	19	4	15	915.2	447.60	0.90	716	434	850
19	5	15	20	6	15	1029.0	447.60	1.12	722	436	857
19	6	14	18	5	14	871.4	490.50	0.74	728	439	868
19	6	14	19	5	14	906.5	490.50	0.73	725	438	864
19	6	14	20	7	14	1036.9	490.50	0.97	731	440	870
19	7	13	18	6	13	863.5	541.42	0.61	738	443	881
19	7	13	19	6	13	898.4	541.42	0.56	735	442	876
19	7	13	20	8	13	1044.8	541.42	0.81	740	444	882
19	8	12	18	7	12	855.6	600.26	0.48	747	447	892
19	8	12	19	7	12	890.5	600.26	0.41	744	446	887
19	8	12	20	9	12	1052.6	600.26	0.65	748	447	891
19	9	11	18	8	11	847.8	666.98	0.37	756	451	899
19	9	11	19	8	11	882.6	666.98	0.28	752	450	896
19	9	11	20	10	11	1060.4	666.98	0.51	754	451	898
19	10	10	18	9	10	840.0	741.52	0.27	762	455	906
19	10	10	19	9	10	874.8	741.52	0.19	758	453	902
19	10	10	20	11	10	1068.2	741.52	0.38	758	453	903
20	0	20	20	1	20	949.4	363.63	6.17	693	427	824
20	0	20	21	1	20	1015.5	363.63	0.63	693	427	817
20	1	19	19	0	19	886.6	392.41	0.48	695	428	827
20	1	19	20	2	19	950.5	392.41	3.69	696	428	823
20	1	19	21	2	19	1009.0	392.41	1.12	692	426	809
20	2	18	19	1	18	893.2	412.71	0.91	696	427	822
20	2	18	20	3	18	957.3	412.71	1.83	697	427	819
20	2	18	21	3	18	1004.9	412.71	1.54	691	425	803
20	3	17	19	2	17	896.0	428.28	1.22	696	427	817
20	3	17	20	4	17	970.6	428.28	1.12	702	429	823
20	3	17	21	4	17	1011.1	428.28	1.30	697	427	812
20	4	16	19	3	16	888.7	450.80	0.95	703	429	828
20	4	16	20	5	16	983.0	450.80	0.99	711	432	839
20	4	16	21	5	16	1021.8	450.80	1.10	706	430	831
20	5	15	19	4	15	878.3	484.56	0.76	713	433	844
20	5	15	20	6	15	992.0	484.56	0.87	720	435	853
20	5	15	21	6	15	1030.6	484.56	0.97	716	433	846
20	6	14	19	5	14	869.7	527.27	0.64	722	436	857
20	6	14	20	7	14	1000.1	527.27	0.71	728	438	865
20	6	14	21	7	14	1038.7	527.27	0.84	725	437	859
20	7	13	19	6	13	861.7	578.11	0.52	731	440	870
20	7	13	20	8	13	1008.1	578.11	0.55	737	442	877
20	7	13	21	8	13	1046.6	578.11	0.70	733	440	871

20	8	12	19	7	12	853.8	636.91	0.41	740	444	882
20	8	12	20	9	12	1016.0	636.91	0.40	745	446	887
20	8	12	21	9	12	1054.4	636.91	0.56	742	444	883
20	9	11	19	8	11	846.0	703.59	0.32	748	447	891
20	9	11	20	10	11	1023.8	703.59	0.28	751	449	895
20	9	11	21	10	11	1062.2	703.59	0.44	747	447	890
20	10	10	19	9	10	838.2	778.11	0.23	754	451	898
20	10	10	20	11	10	1031.6	778.11	0.19	756	451	900
20	10	10	21	11	10	1070.0	778.11	0.33	751	449	895