

Vented-Box Loudspeaker Design with a Given Driver

(From the book *Introduction to Electroacoustics and Audio Amplifier Design, Second Edition - Revised Printing* by W. Marshall Leach, Jr., published by Kendall/Hunt, © 2001.)

The vented-box design procedure for a given driver requires a knowledge of the driver parameters f_S , Q_{TS} , and V_{AS} . A value for Q_L must be assumed. The rule of thumb that is commonly used is to assume the value $Q_L = 7$ for the initial design. After the required box volume is determined, it can be assumed that the value for Q_L is correct if the box volume is in the medium range, i.e. 2 to 3 cubic feet. For smaller volumes, a larger value of Q_L should be assumed and the design procedure repeated. For larger volumes, a smaller value of Q_L should be assumed and the design procedure repeated.

Vented-box design charts for $Q_L = \infty, 20, 10, 7, 5$, and 3 are given in Figs. 1 through 6. The procedure for using these charts is as follows:

1. On the left ordinate of the appropriate chart, locate the value of Q_{TS} for the driver. Draw a horizontal line through this value which intersects the Q_{TS} curve on the chart. Draw a vertical line through this intersection that cuts the abscissa.
2. Read the value of the box compliance ratio α from the intersection of the vertical line with the abscissa. Calculate the required box volume $V_{AB} = V_{AS}/\alpha$.
3. Read the value of the Helmholtz tuning ratio $h = f_B/f_S$ from the right ordinate corresponding to the point that the vertical line in step 1 crosses the h curve on the chart. Calculate the Helmholtz frequency $f_B = hf_S$.
4. Read the value $q = f_\ell/f_S$ from the right ordinate corresponding to the point that the vertical line in step 1 crosses the q curve on the chart. Calculate the system lower half-power or -3 dB cutoff frequency $f_\ell = qf_S$.
5. For a vent or port of cross section S_P , calculate its length from the formula

$$L_P = \left(\frac{c}{2\pi f_B} \right)^2 \frac{S_P}{V_{AB}} - 1.463 \sqrt{\frac{S_P}{\pi}} \quad (1)$$

The selection of the vent area is an important consideration. For a given f_B , it can be seen from Eq. (1) that the vent length increases as its area is increased. As a general rule, the vent area should be chosen as large as possible to minimize noise caused by turbulent air flow. If the area is too large, however, the vent will extend too far into the enclosure and might have its unflanged end too close to the back wall. Ideally, the vent should extend to about one-half the depth of the box. In the event that it is too long to fit in the enclosure, an elbow shaped vent can be used. Round PVC tubing makes a good vent material. To increase the vent area, two or more equal length vent tubes can be used. In this case, the length is calculated as if the tubes are a single tube having a cross-sectional area equal to the total area of all the tubes. There is only one Helmholtz frequency when multiple vents are used.

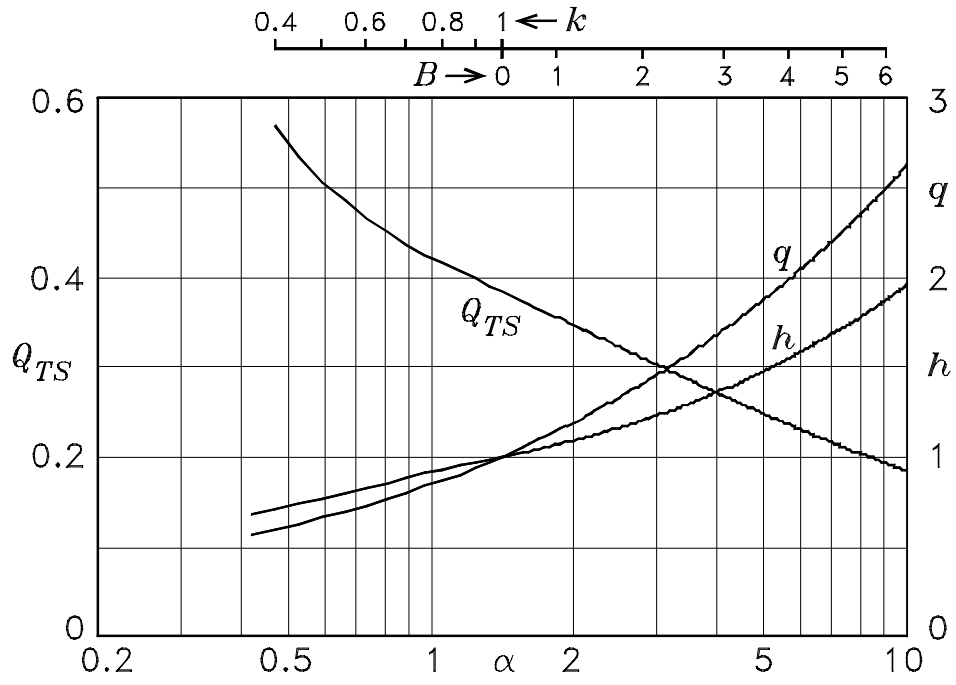


Figure 1: Vented-box alignment chart for $Q_L = \infty$.

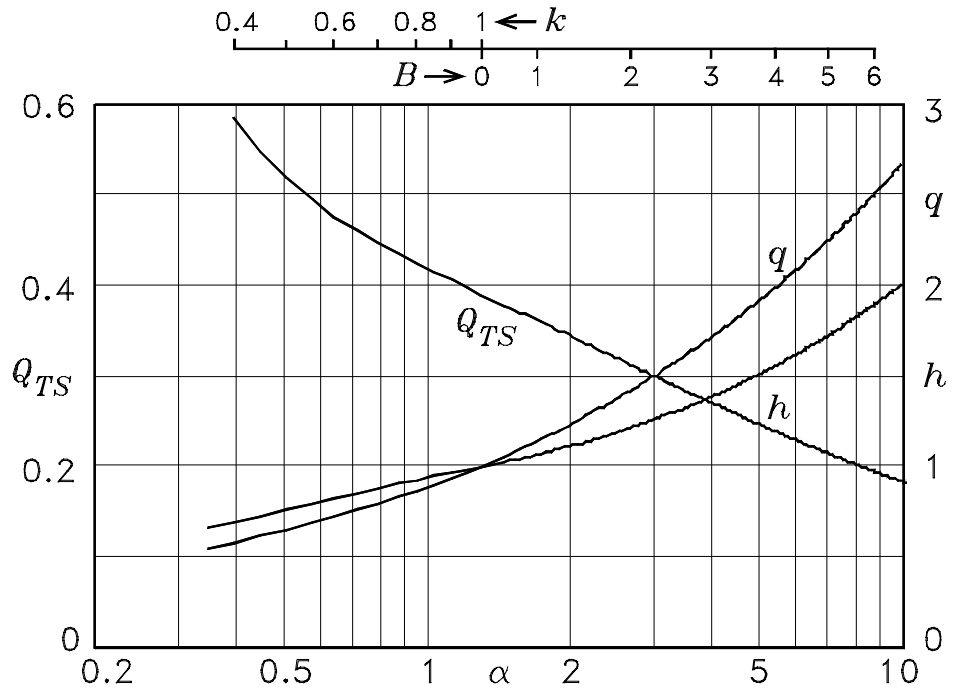


Figure 2: Vented-box alignment chart for $Q_L = 20$.

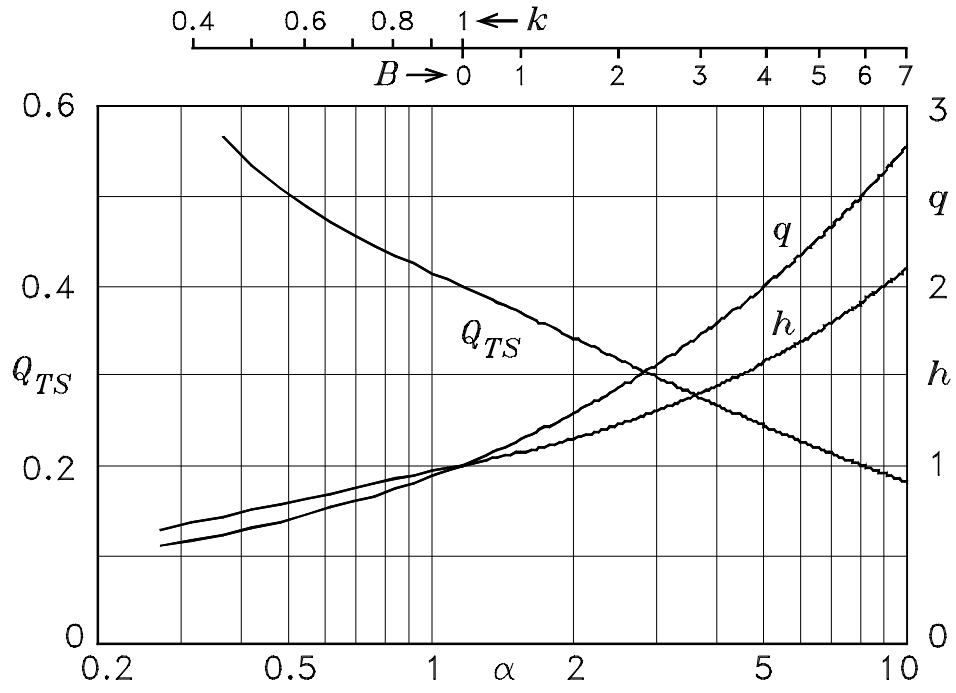


Figure 3: Vented-box alignment chart for $Q_L = 10$.

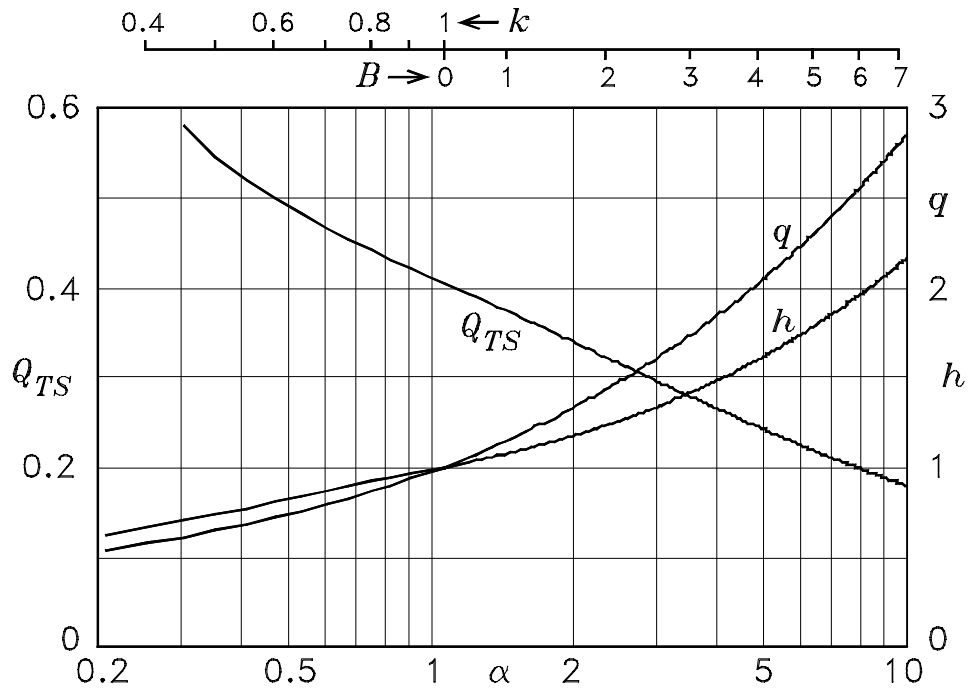


Figure 4: Vented-box alignment chart for $Q_L = 7$.

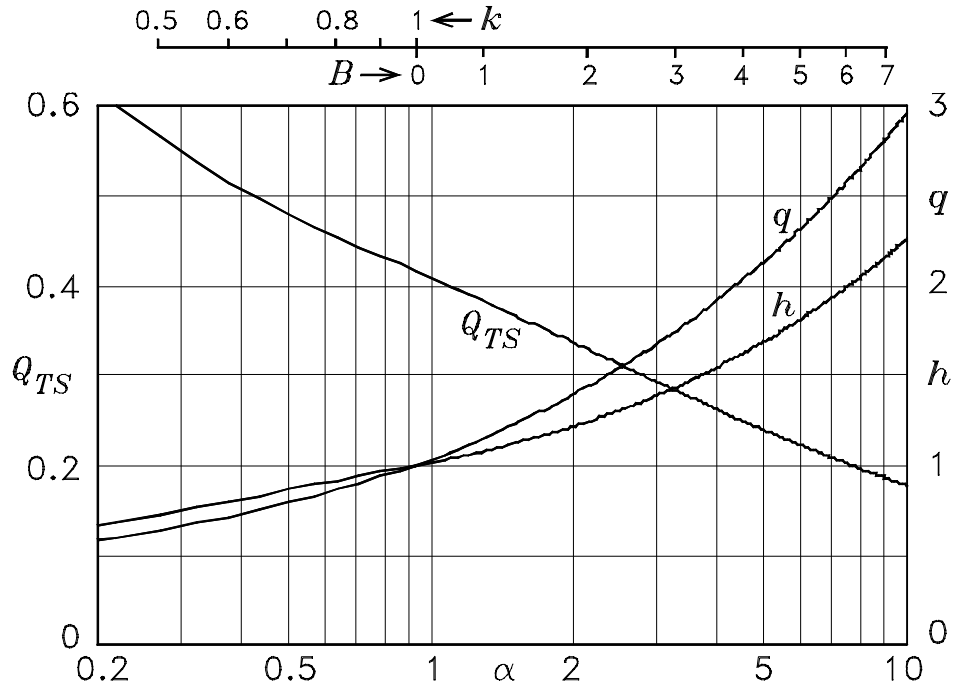


Figure 5: Vented-box alignment chart for $Q_L = 5$.

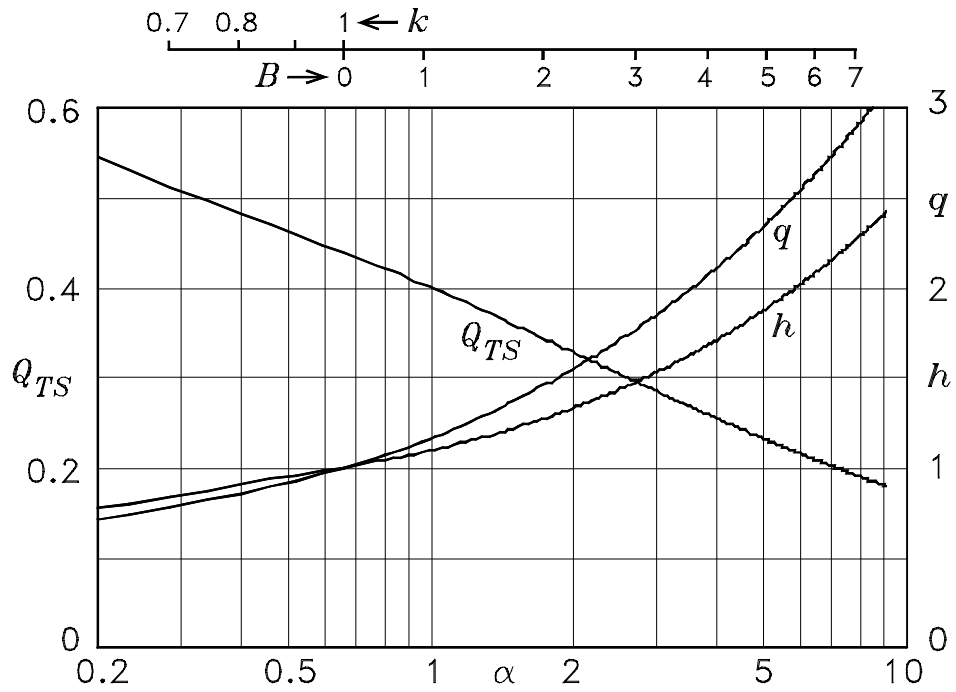


Figure 6: Vented-box alignment chart for $Q_L = 3$.

After a system is designed and built, the Helmholtz frequency can be measured by connecting the system to the parameter measurement test set described in *Introduction to Electroacoustics and Audio Amplifier Design*. At the Helmholtz frequency, the system exhibits a null in its input impedance so that the voice-coil voltage exhibits a null. Often, it will be found that the measured frequency will not correspond to the desired frequency. There is a simple procedure which can be used to tune the port length. Cut the port 20% longer than the value predicted by Eq. (1). Denote this length by L'_P . Measure the Helmholtz frequency for this length. Denote this by f'_B (which is less than f_B). The amount which L'_P must be reduced to make the Helmholtz frequency increase from f'_B to f_B is given by

$$\Delta L_P = L'_P - L_P = \left(\frac{c}{2\pi}\right)^2 \frac{S_P}{V_{AB}} \left[\frac{1}{f_B'^2} - \frac{1}{f_B^2} \right] \quad (2)$$

Example 1 A driver has the parameters $Q_{TS} = 0.3$, $f_S = 28$ Hz, $V_{AS} = 6$ feet³, and $R_E = 7 \Omega$. The inductor in the crossover network has the dc resistance $R_g = 1 \Omega$ that is in series with the woofer. Design a vented-box enclosure for the driver.

Solution. In order to account for R_g , we need the electrical quality factor Q_{ES} of the driver. Because this is not given, the value of Q_{MS} must be estimated and then Q_{ES} calculated. Let us assume that $Q_{MS} \simeq 4$. Thus we have

$$Q_{ES} = \frac{Q_{MS}Q_{TS}}{Q_{MS} - Q_{TS}} = 0.324 \quad (3)$$

Q_{ES} and Q_{TS} with R_g in series with the driver are

$$Q'_{ES} = Q_{ES} \left(1 + \frac{R_g}{R_E}\right) = 0.371 \quad Q'_{TS} = \frac{Q'_{ES}Q_{MS}}{Q'_{ES} + Q_{MS}} = 0.339 \quad (4)$$

From the $Q_L = 7$ design chart, we have $\alpha = 2$, $h = 1.2$, and $f_3/f_S = 1.3$. Thus $V_{AB} = V_{AS}/\alpha = 3$ feet³, $f_B = hf_S = 33.6$ Hz, and $f_\ell = qf_S = 36.4$ Hz. Let us assume a vent tube that has a circular cross section with a diameter of 3 inches. The length of the vent is given by

$$L_P = \left[\frac{1131}{2\pi 33.6} \right]^2 \frac{\pi (1.5/12)^2}{3} - 1.463 (1.5/12) = 0.2867 \text{ foot or } 3.441 \text{ inches} \quad (5)$$

System Verification

To verify a system design, any crossover network must be disconnected. The frequencies f_L , f_B , and f_H shown in Fig. 7 must be measured. At these frequencies, the voice-coil impedance is real and is labeled R_L , R_B , and R_H in the figure. The value of R_B must also be measured. These can be determined by the techniques described in *Introduction to Electroacoustics and Audio Amplifier Design*. The frequencies f_L , f_B , and f_H are most easily determined as the frequencies where the phase crosses zero. However, enclosure losses and the voice-coil inductance can perturb the phase more than the magnitude, so that it is preferable to determine f_L and f_H at the maximum impedance and f_B at the minimum. From these measurements, the driver resonance frequency f_{SB} for the air load mass presented

by the enclosure, the compliance ratio α , and the vent tuning ratio h can be calculated from the relations

$$f_{SB} = \frac{f_L f_H}{f_B} \quad a = \left[\left(\frac{f_B}{f_L} \right)^2 - 1 \right] \left[1 - \left(\frac{f_B}{f_H} \right)^2 \right] \quad h = \frac{f_B}{f_{SB}} \quad (6)$$

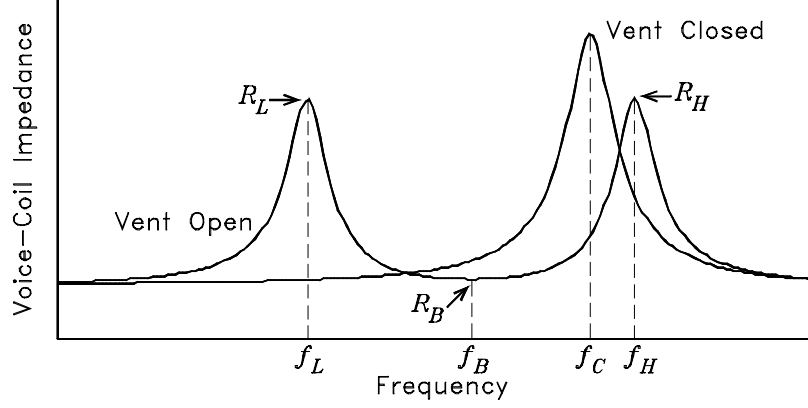


Figure 7: $|Z_{VC}|$ versus frequency with the vent open and the vent closed.

To determine the box quality factor Q_L , the driver voice-coil resistance R_E , its resonance frequency f_S , and its quality factors Q_{ES} and Q_{MS} must be known. First, adjust the quality factors for the air load mass presented by the enclosure using the relations $Q'_{ES} = Q_{ES} \times f_S/f_{SB}$ and $Q'_{MS} = Q_{MS} \times f_S/f_{SB}$. The box quality factor is given by

$$Q_L = \frac{h}{\alpha} \left[\frac{R_E}{Q'_{ES} (R_B - R_E)} - \frac{1}{Q'_{MS}} \right] \quad (7)$$

QL=3

Qts	H (F_B/F_S)	Alpha	F_3/F_S
.815828003906674	.497960064982315	-7.18722933740955E-02	.478370598537591
.724084093754091	.563719065069613	-8.69515857619601E-03	.526544700825304
.661571430279948	.620191382533099	4.17160184169123E-02	.571300236159653
.615975823981335	.67097369354763	8.77819516280088E-02	.614372447264597
.581114722855709	.717548894352169	.133359088242676	.656382917241469
.553472359440862	.760587910183841	.180397335224044	.697560613858776
.530891834909876	.800414097454025	.229893499057968	.737981400109944
.511979087875338	.837199864160552	.282308054541309	.777661486239014
.495797740524476	.8710574928751	.337774090910359	.816596778653748
.481699773716538	.902082383446301	.396214412630618	.854779771582686
.469225795888465	.930373042065491	.457413845269537	.892206452770015
.458043519415343	.956039138410145	.521067704261335	.928878595662052
.447908376126321	.979203342615187	.58681639187302	.964803938499437
.43863753333649	1.00000000000002	.654271111111308	.999995215083896
.424543840385929	1.0322309216732	.767811714854557	1.05710229426961
.421037024767905	1.0405934783509	.797844289016294	1.07187430890752
.417586925504076	1.04896051248508	.82813099378037	1.08661714375428
.414192200450758	1.05733188354323	.858671831614901	1.10132479108275
.410851548531585	1.06570745693244	.889466804795494	1.11599132562684
.407563708228963	1.07408710368565	.920515915420731	1.13061180305501
.404327456138288	1.08247070016774	.951819165426314	1.1451822300527
.401141605582157	1.09085812779984	.983376556597998	1.15970043417737
.398005005281904	1.09924927280067	1.01518809058342	1.1741624467265
.394916538083928	1.10764402594372	1.04725376890295	1.18856787570971
.391875119738369	1.11604228232901	1.07957359295958	1.20291539976958
.388879697727803	1.12444394116859	1.11214756404808	1.21720455167929
.385929250143741	1.13284890558469	1.1449756833633	1.2314348236058
.383022784608792	1.1412570824197	1.17805795200786	1.24560566924201
.380159337242474	1.14966838205724	1.21139437099917	1.25971824648496
.37733797166873	1.15808271825346	1.24498494127594	1.27377191797459
.374557778063294	1.16650000797799	1.2788296637041	1.28776860625582
.371817872239164	1.1749201712638	1.31292853908228	1.30170930585824
.369117394768473	1.18334313106554	1.34728156814687	1.31559324484716
.366455510139171	1.19176881312564	1.38188875157666	1.32942304630151
.363831405944991	1.20019714584777	1.4167500899971	1.34319956076235
.361244292107216	1.20862806017724	1.45186558398429	1.35692359664254
.358693400126893	1.21706148948773	1.4872352340686	1.37059592270878
.356177982366129	1.22549736947415	1.522859040738	1.38421895902935
.353697311357231	1.23393563805109	1.55873700444125	1.39779254530206
.351250679138478	1.24237623525672	1.59486912559071	1.41131943670698
.348837396615365	1.25081910316148	1.63125540456498	1.42479982291998

QL=3

Qts	H (F_B/F_S)	Alpha	F_3/F_5
.346456792946237	1.25926418578165	1.6678958417114	1.43823512240904
.344108214951256	1.26771142899727	1.70479043734831	1.45162671819951
.341791026543719	1.27616078047415	1.74193919176713	1.46497554458613
.339504608182753	1.28461218958987	1.77934210523432	1.47828292287971
.337248356346511	1.29306560736346	1.81699917799316	1.49154973124163
.335021684042954	1.30152099504033	1.85491042191773	1.50477806587909
.332824016125376	1.30997828845662	1.89307581268367	1.51796791589031
.33065479531734	1.31843745288949	1.93149536347342	1.53112050432615
.328513477283408	1.32689844527524	1.97016907444067	1.54423743445714
.326399531351666	1.33536122388925	2.00909694572437	1.55731946583018
.324312440092959	1.34382574829366	2.04827897744981	1.57036734010879
.322251698915337	1.35229197928742	2.08771516972955	1.58338218924108
.320216815673079	1.36075987885864	2.12740552266429	1.59636471949266
.318207310289702	1.36922941013924	2.16735003634376	1.60931602768214
.316222714394397	1.37770053736158	2.20754871084746	1.6222371932781
.314262570971332	1.38617322581718	2.24800154624539	1.63512887507547
.312326434021314	1.39464744181718	2.2887085425987	1.64799171910285
.310413868235314	1.40312315265469	2.32966969996037	1.66082676209643
.308524448679376	1.4116003265687	2.37088501837576	1.67363462439099
.306657760490461	1.42007893270971	2.41235449788317	1.68641591542998
.304813398582796	1.42855894110675	2.45407813851432	1.69917163518194
.302990967364305	1.43704032263589	2.49605594029487	1.71190237098603
.301190080462744	1.44552304899013	2.53828790324484	1.72460870086082
.299410360461133	1.4540070926505	2.58077402737903	1.7372911939402
.297651438642157	1.4624924268585	2.62351431270739	1.7499508093947
.295912954741164	1.47097902558959	2.66650875923542	1.76258789914736
.294194556707443	1.47946686352787	2.70975736696445	1.77520300728537
.292495900473451	1.48795591604177	2.75326013589202	1.78779667057263
.290816649731708	1.49644615916076	2.7970170660121	1.80036981512203
.289156475719042	1.50493756955303	2.84102815731544	1.81292236874796
.287515057007928	1.51343012450403	2.88529340978977	1.82545524427756
.285892079304646	1.52192380189594	2.92981282342006	1.83796895160942
.284287235253992	1.53041858018788	2.97458639818875	1.85046399484467
.282700224250325	1.53891443839702	3.01961413407593	1.86294047864076
.281130752254684	1.54741135608033	3.06489603105959	1.87539929106394
.279578531617769	1.55590931331713	3.11043208911572	1.88784052726739
.278043280908573	1.56440829069222	3.15622230821857	1.90026467185638
.27652472474844	1.57290826927981	3.20226668834072	1.91267240079844
.275022593650371	1.58140923062792	3.24856522945329	1.92506379714883
.273536623863381	1.58991115674347	3.29511793152608	1.9374393326183
.272066557221716	1.59841403007792	3.34192479452763	1.94979947475866

QL=3

Qts	H (F_B/F_S)	Alpha	F_3/F_5
.270612140998769	1.60691783351339	3.38898581842542	1.96214449188123
.269173127765519	1.61542255034942	3.43630100318595	1.97447464924727
.267749275253335	1.62392816429008	3.48387034877482	1.98679040406095
.266340346220984	1.63243465943169	3.53169385515686	1.99909220996974
.264946108325707	1.64094202025089	3.5797715222962	2.01138012819232
.263566333998209	1.64945023159321	3.62810335015639	2.02365460675672
.262200800321431	1.65795927866202	3.67668933870043	2.03591589635142
.260849288912968	1.66646914700789	3.72552948789087	2.04816424529296
.259511585811021	1.67497982251833	3.77462379768987	2.06040009343508
.258187481363733	1.68349129140791	3.82397226805927	2.07262349046687
.256876770121827	1.69200354020868	3.87357489896066	2.08483487161432
.25557925073441	1.70051655576101	3.92343169035538	2.09703447609808
.254294725847833	1.70903032520465	3.97354264220465	2.10922254119479
.253023002007528	1.71754483597021	4.02390775446957	2.12139930230844
.251763889562694	1.72606007577083	4.07452702711115	2.13356489659818
.250517202573751	1.73457603259419	4.12540046009039	2.14571965251216
.249282758722468	1.74309269469481	4.1765280533683	2.15786389652743
.248060379224673	1.75161005058657	4.22790980690592	2.16999766454844
.24684988874546	1.7601280890355	4.27954572066438	2.18212127995156
.245651115316813	1.76864679905278	4.3314357946049	2.19423487215624
.244463890257568	1.77716616988808	4.38358002868885	2.20633856940092
.243288048095629	1.78568619102297	4.43597842287774	2.21843278664834
.242123426492374	1.79420685216463	4.48863097713328	2.23051755342049
.240969866169177	1.80272814323981	4.54153769141736	2.24259309010094
.239827210835977	1.81125005438887	4.5946985656921	2.25465961580519
.238695307121821	1.8197725759601	4.64811359991987	2.2667173484248
.237574004507339	1.82829569850423	4.70178279406327	2.27876631338229
.236463155259058	1.83681941276903	4.7557061480852	2.29080672660186
.235362614365531	1.84534370969416	4.80988366194882	2.30283870736768
.234272239475193	1.85386858040619	4.86431533561759	2.3148625650559
.233191890835912	1.86239401621368	4.91900116905529	2.32687832153409
.232121431236168	1.87092000860254	4.973941162226	2.33888618882442
.231060725947817	1.87944654923146	5.02913531509412	2.35088628266536
.230009642670392	1.88797362992747	5.08458362762441	2.3628787180621
.228968051476876	1.89650124268169	5.14028609978195	2.37486370450701
.227935824760934	1.90502937964517	5.19624273153217	2.38684135545197
.226912837185524	1.91355803312488	5.25245352284084	2.39881178368762
.225898965632873	1.9220871955798	5.30891847367412	2.41077510136387
.224894089155756	1.93061685961714	5.36563758399849	2.42273142000988
.223898088930054	1.93914701798869	5.42261085378082	2.43468094549966
.222910848208544	1.94767766358724	5.47983828298832	2.44662369313565

QL=3

Qts	H (F_B/F_S)	Alpha	F_3/F_S
.22193225227588	1.95620878944312	5.53731987158862	2.45855986755108
.220962188404743	1.96474038872089	5.59505561954966	2.47048957784068
.220000545813116	1.97327245471604	5.65304552683979	2.48241283781273
.219047215622643	1.98180498085186	5.71128959342772	2.4943299450883
.218102090818062	1.99033796067638	5.76978781928252	2.50624077041816
.217165066207656	1.99887138785937	5.82854020437367	2.51814556301975
.21623603838471	2.00740525618945	5.88754674867098	2.53004438221323
.215314905689933	2.0159395595713	5.94680745214466	2.54193738149293
.214401568174826	2.02447429202293	6.00632231476527	2.55382457207963
.213495927565961	2.03300944767302	6.06609133650376	2.56570615385054
.212597887230149	2.04154502075832	6.12611451733144	2.57758213726786
.211707352140472	2.0500810056212	6.18639185721998	2.58945257974196
.210824228843151	2.05861739670718	6.24692335614142	2.60131763270873
.209948425425228	2.06715418856254	6.30770901406816	2.61317739999395
.209079851483036	2.07569137583208	6.36874883097297	2.62503193792269
.208218418091445	2.08422895325684	6.43004280682896	2.63688134964885
.207364037773847	2.09276691567194	6.49159094160961	2.64872564378875
.206516624472868	2.10130525800443	6.55339323528875	2.66056496999181
.205676093521791	2.10984397527129	6.61544968784054	2.67239938338728
.204842361616654	2.11838306257737	6.67776029923951	2.68422898589335
.204015346789027	2.12692251511346	6.74032506946052	2.69605383209181
.203194968379427	2.13546232815442	6.80314399847878	2.70787397632847
.20238114701137	2.14400249705727	6.86621708626984	2.71968951970736
.201573804566031	2.15254301725944	6.92954433280955	2.73150051607066
.200772864157505	2.16108388427703	6.99312573807413	2.74330701904438
.199978250108643	2.16962509370304	7.05696130204011	2.75510912898227
.199189887927459	2.17816664120577	7.12105102468434	2.7669068990467
.198407704284076	2.18670852252719	7.18539490598398	2.77870038220191
.197631626988219	2.19525073348134	7.24999294591654	2.79048967810968
.196861584967213	2.20379326995283	7.31484514445981	2.8022747924322
.196097508244503	2.2123361278953	7.37995150159189	2.81405577757079
.195339327918652	2.22087930333002	7.4453120172912	2.82583277943766
.194586976142826	2.2294227923444	7.51092669153645	2.83760580316359
.19384038610475	2.23796659109069	7.57679552430666	2.84937490058649
.193099492007102	2.24651069578455	7.64291851558112	2.86114012338079
.192364229048372	2.25505510270378	7.70929566533943	2.87290152306176
.191634533404131	2.26359980818702	7.77592697356147	2.88465919776147
.190910342208735	2.27214480863252	7.84281244022741	2.8964131986471
.190191593537427	2.28069010049689	7.90995206531768	2.9081634832513
.189478226388845	2.28923568029394	7.977345848813	2.91991019599547
.188770180667913	2.29778154459349	8.04499379069436	2.93165338761839

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Qts	H (F_B/F_S)	Alpha	F_3/F_S
.188067397169114	2.30632769002027	8.11289589094301	2.94339301531588
.187369817560124	2.31487411325278	8.18105214954048	2.95512922301986
.186677384365817	2.32342081102225	8.24946256646854	2.96686206107266
.185990040952603	2.33196778011156	8.31812714170923	2.97859148636133
.185307731513127	2.34051501735422	8.38704587524485	2.99031759570912
.184630401051282	2.34906251963338	8.45621876705793	3.00204048576862
.183957995367555	2.35761028388083	8.52564581713125	3.01376011314332
.183290461044691	2.36615830707608	8.59532702544786	3.02547652765197
.182627745433658	2.37470658624537	8.66526239199101	3.03718982560473
.181969796639915	2.38325511846084	8.73545191674422	3.04890005656353
.181316563509977	2.39180390083957	8.80589559969122	3.06060717682491
.180667995618256	2.40035293054274	8.87659344081597	3.07231128237992
.180024043254195	2.40890220477479	8.94754544010269	3.08401242251488
.179384657409655	2.41745172078258	9.01875159753576	3.09571064641727
.178749789766586	2.42600147585458	9.09021191309985	3.10740591010966

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Qts	H (F_B/F_S)	Alpha	F_3/F_S
.714422757803155	.592611354641102	.124684492016534	.52185783245673
.648933969722681	.637507900931065	.171021506184392	.559946675681954
.601337235239811	.679761352177656	.217695566598786	.598108224554939
.565232329240881	.719817537717279	.266637898870749	.636341424473601
.536869833344825	.757774859631722	.318786938314891	.674530538150391
.513921149392958	.793602089251227	.374545191595041	.712539005833394
.494875156764078	.827233982517257	.433996527611361	.750243488774755
.478716955107567	.858613870551862	.497022343386735	.787544252620348
.46474576116345	.8877113173054	.56337069330491	.824366111472999
.452466444272779	.914527502511474	.632701647287314	.860655840821513
.441522271290323	.939094493967339	.704619553963682	.896378534529774
.431651793112595	.961471592722007	.77869732785357	.931513917970275
.422660425976787	.981740464675517	.854495305527603	.966053036474218
.414401273040901	1.000000000001	.931576000001152	.999995215084295
.401787649212377	1.0284222165026	1.06075490863907	1.05515025442224
.398638556658219	1.03581989951117	1.09491724540483	1.06941294520682
.395536351229192	1.04323062071195	1.12936603347545	1.08364528521852
.392480049917685	1.05065401133368	1.16410135513336	1.09784142152698
.38946869490749	1.05808971649008	1.19912328859921	1.11199558610795
.386501352873408	1.0655373945321	1.23443190826924	1.12610299037279
.383577114297826	1.07299671643578	1.27002728493679	1.14015979325898
.3806950928043	1.08046736522371	1.30590948599905	1.15416396501778
.377854424508105	1.08794903541793	1.34207857565016	1.16811168529348
.375054267383664	1.0954414325222	1.37853461506173	1.18200268992774
.372293800648722	1.10294427253195	1.41527766255167	1.19583578495014
.369572224165089	1.11045728147018	1.4523077737421	1.20961062090787
.366888757855741	1.11798019494764	1.48962500170735	1.22332680276808
.364242641138037	1.12551275774602	1.52722939711245	1.23698389238092
.361633132372791	1.13305472342254	1.56512100834308	1.25058313884195
.359059508328919	1.14060585393487	1.6032998816274	1.2641240030285
.356521063663351	1.14816591928501	1.64176606115037	1.27760848158077
.354017110415895	1.15573469718125	1.68051958916113	1.29103764383178
.351546977518746	1.16331197271682	1.71956050607384	1.30441080225042
.349110010320278	1.17089753806465	1.75888885056249	1.31773063141442
.346705570122816	1.17849119218705	1.79850465965006	1.33099804265301
.344333033734015	1.18609274055955	1.83840796879239	1.34421390111015
.341991793031531	1.19370199490812	1.87859881195716	1.357379028491
.339681254540615	1.20131877295904	1.91907722169827	1.37049587751428
.337400839024315	1.20894289820066	1.95984322922594	1.38356434132667
.335149981085918	1.2165741996564	2.00089686447275	1.39658719561631
.332928128783316	1.22421251166844	2.042238156156	1.40956467265509

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Qts	H (F_B/F_S)	Alpha	F_3/F_S
.330734743254953	1.23185767369149	2.08386713183653	1.42249821754465
.328569298357025	1.23950953009603	2.12578381797421	1.4353892367518
.326431280311605	1.24716792998067	2.16798823998041	1.44823868976586
.324320187365387	1.25483272699295	2.21048042226754	1.46104791579652
.322235529458717	1.26250377915831	2.25326038829594	1.47381781317338
.320176827904627	1.27018094871668	2.29632816061814	1.48655047612612
.318143615077551	1.27786410196641	2.3396837609208	1.4992459297263
.316135434111443	1.28555310911504	2.38332721006442	1.51190540013541
.314151838607009	1.29324784413662	2.42725852812089	1.52453049204268
.312192392347768	1.30094818463529	2.47147773440911	1.53712197477059
.310256669024674	1.30865401171471	2.51598484752871	1.54968059822292
.308344251969036	1.31636520985314	2.56077988539208	1.56220749569978
.306454733893474	1.32408166678381	2.60586286525468	1.57470337870217
.304587716640657	1.33180327338039	2.65123380374383	1.58716934243699
.302742810939589	1.33952992354722	2.69689271688608	1.59960646330818
.300919636169197	1.34726151411422	2.7428396201331	1.612015401393
.29911782012899	1.35499794473603	2.78907452838641	1.62439680296935
.297336998816578	1.36273911779541	2.83559745602073	1.63675169821213
.295576816211818	1.37048493831054	2.88240841690632	1.64908070563951
.293836924067384	1.37823531384612	2.92950742443011	1.66138443202793
.292116981705563	1.38599015442797	2.97689449151589	1.67366386786152
.290416655821067	1.3937493724612	3.02456963064345	1.68591959609063
.288735620289678	1.40151288265148	3.07253285386684	1.69815218964587
.287073555982545	1.40928060192955	3.12078417283179	1.71036221191599
.285430150585934	1.4170524493786	3.16932359879221	1.72255060946922
.283805098426283	1.42482834616456	3.21815114262603	1.73471773027397
.282198100300373	1.43260821546904	3.2672668148502	1.74686411085509
.280608863310463	1.44039198242488	3.31667062563506	1.75899027990487
.279037100704227	1.44817957405417	3.366362584818	1.77109714854207
.277482531719342	1.45597091920858	3.41634270191653	1.78318464517535
.275944881432578	1.46376594851203	3.46661098614077	1.79525366674487
.274423880613252	1.47156459430542	3.51716744640526	1.80730471326378
.272919265580898	1.47936679059352	3.56801209134044	1.81933827857892
.2714307782065	1.48717247457991	3.61914493243426	1.83135446440275
.269958165204159	1.49498158010342	3.67056597120227	1.84335413923047
.268501178887841	1.50279404763401	3.72227521896454	1.85533739484106
.26705957643434	1.51060981733651	3.77427268331573	1.86730470445103
.265633119917865	1.51842883080187	3.8265583716163	1.87925672894257
.264221576190392	1.52625103100464	3.87913229100117	1.8911935462874
.262824716765384	1.53407636226189	3.931994448388	1.90311561610656
.261442317704785	1.54190477019371	3.98514485048512	1.91502339363773

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Qts	H (F_B/F_S)	Alpha	F_3/F_S
.260074159509179	1.54973620168499	4.03858350379909	1.92691713817385
.258720027011022	1.5575706048486	4.09231041464203	1.93879710583833
.257379709270842	1.56540792898987	4.14632558913854	1.95066374104435
.256052999476325	1.57324812457226	4.20062903323239	1.96251748447377
.254739694844187	1.58109114318423	4.25522075269292	1.97435839137719
.253439596524762	1.58893693750726	4.3101007531212	1.98618689660977
.252152509509201	1.59678546128495	4.36526903995589	1.99800324115786
.250878242539219	1.60463666929317	4.42072561847887	2.0098076635702
.249616608019306	1.6124905173112	4.47647049382072	2.02160059022385
.248367421931327	1.62034696209387	4.53250367096586	2.03338206454461
.247130503751434	1.6282059613446	4.58882515475757	2.04515250814973
.245905676369226	1.63606747368935	4.6454349499028	2.05691215024404
.244692766009088	1.6439314586514	4.70233306097674	2.06866121805371
.243491602153639	1.65179787662702	4.75951949242726	2.08039993690237
.242302017469227	1.65966668886186	4.81699424857919	2.0921284357164
.24112384773341	1.66753785742812	4.87475733363834	2.10384703095928
.239956931764368	1.67541134520252	4.9328087516955	2.11555603707576
.238801111352177	1.6832871158449	4.99114850673018	2.12725548358135
.237656231191903	1.69116513377751	5.04977660261425	2.13894568180444
.236522138818446	1.69904536416501	5.10869304311542	2.15062675290024
.235398684543103	1.70692777289507	5.16789783190064	2.1622988168675
.234285721391773	1.71481232655953	5.2273909725393	2.17396227468515
.233183105044785	1.72269899243624	5.28717246850637	2.18561714955937
.232090693778271	1.73058773847141	5.34724232318538	2.19726365174217
.231008348407068	1.73847853326246	5.40760053987133	2.20890199022357
.229935932229077	1.74637134604154	5.46824712177345	2.22053237277799
.228873310971059	1.75426614665937	5.5291820720179	2.23215481863398
.227820352735813	1.76216290556971	5.59040539365034	2.24376953365916
.226776927950697	1.77006159381426	5.65191708963844	2.25537662906318
.225742909317465	1.77796218300797	5.71371716287423	2.26697640223721
.224718171763361	1.78586464532485	5.7758056161765	2.27856886899869
.223702592393455	1.79376895348418	5.83818245229293	2.29015423141155
.222696050444174	1.80167508073709	5.90084767390231	2.30173259726729
.221698427237992	1.80958300085363	5.96380128361662	2.31330407366716
.22070960613926	1.81749268811011	6.02704328398298	2.32486886023894
.219729472511122	1.82540411727688	6.09057367748562	2.33642706260114
.21875791367351	1.83331726360646	6.15439246654777	2.34797878575564
.217794818862167	1.84123210282196	6.2184996535334	2.35952413410859
.216840079188681	1.84914861110589	6.282895240749	2.37106321149053
.215893587601502	1.85706676508927	6.34757923044525	2.38259621409106
.214955238847906	1.86498654184108	6.41255162481867	2.39412315162568

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Qts	H (F_B/F_S)	Alpha	F_3/F_S
.21402492943689	1.87290791885791	6.47781242601313	2.40564421912422
.213102557602962	1.88083087405402	6.54336163612142	2.41715951815004
.212188023270809	1.88875538575163	6.60919925718667	2.42866905707766
.211281228020821	1.89668143267147	6.67532529120381	2.4401731219909
.210382075055431	1.90460899392357	6.74173974012091	2.45167158138593
.209490469166273	1.91253804899842	6.80844260584049	2.46316467405554
.208606316702112	1.92046857775819	6.87543389022084	2.47465245305385
.207729525537546	1.92840056042838	6.94271359507722	2.48613506358882
.206860005042441	1.93633397758955	7.01028172218308	2.49761251175118
.205997666052094	1.94426881016936	7.0781382732712	2.50908498818261
.205142420838088	1.95220503943479	7.14628325003483	2.52055249831491
.204294183079843	1.96014264698458	7.21471665412877	2.5320150935441
.203452867836818	1.96808161474188	7.28343848717038	2.54347291724718
.202618391521372	1.97602192494707	7.35244875074068	2.55492606627768
.201790671872246	1.98396356015078	7.42174744638526	2.56637459108569
.20096962792866	1.99190650320712	7.49133457561526	2.57781858794708
.200155180005009	1.99985073726708	7.56121013990829	2.58925806075823
.199347249666138	2.00779624577205	7.63137414070934	2.60069315133001
.198545759703184	2.01574301244756	7.70182657943161	2.6121239091104
.197750634109965	2.02369102129723	7.77256745745741	2.62355042932331
.196961798059914	2.03164025659673	7.84359677613889	2.63497276096363
.196179177883523	2.03959070288803	7.91491453679891	2.64639095283966
.195402701046309	2.04754234497378	7.98652074073177	2.65780509949768
.194632296127265	2.05549516791173	8.05841538920393	2.66921524933398
.193867892797803	2.06344915700943	8.13059848345476	2.6806214505766
.19310942180116	2.07140429781898	8.20307002469725	2.69202379715397
.192356814932269	2.0793605761319	8.27583001411862	2.70342233691928
.19161000501807	2.08731797797422	8.34887845288106	2.71481711757405
.190868925898265	2.09527648960158	8.42221534212232	2.72620823248304
.190133512406488	2.10323609749452	8.49584068295631	2.73759568321361
.189403700351895	2.11119678835388	8.56975447647375	2.74897951704045
.188679426501159	2.11915854909631	8.64395672374273	2.76035987262272
.187960628560849	2.12712136684986	8.71844742580923	2.77173675112951
.1872472451602	2.13508522894969	8.79322658369777	2.78311019939843
.186539215834259	2.14305012293396	8.86829419841182	2.79448026414647
.185836481007385	2.15101603653969	8.94365027093444	2.80584699197368
.185138981977113	2.1589829576988	9.01929480222867	2.81721047504513
.184446660898361	2.16695087453426	9.09522779323809	2.82857075969103
.18375946076798	2.17491977535626	9.17144924488728	2.83992780084151
.183077325409622	2.18288964865855	9.24795915808226	2.85128173597489
.182400199458945	2.1908604831148	9.32475753371096	2.86263261111394

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Qts	H (F_B/F_S)	Alpha	F_3/F_S
.181728028349118	2.19883226757511	9.40184437264363	2.87398038098062
.181060758296644	2.20680499106252	9.47921967573331	2.88532518267226
.180398336287468	2.2147786427697	9.55688344381618	2.89666706193165
.179740710063393	2.22275321205564	9.63483567771199	2.90800597329589
.179087828108764	2.23072868844244	9.71307637822447	2.91934200796542
.178439639637442	2.2387050616122	9.79160554614166	2.93067525700098
.177796094580041	2.24668232140394	9.87042318223631	2.94200567477539
.177157143571436	2.25466045781063	9.94952928726624	2.95333330670086
.17652273793852	2.26263946097625	10.0289238619747	2.96465824360342
.175892829688225	2.27061932119293	10.1086069070905	2.97598053070461
.175267371495778	2.27860002889822	10.1885784233289	2.9873001222265
.174646316693204	2.28658157467226	10.2688384113911	2.9986171087795
.174029619258059	2.29456394923522	10.3493868719654	3.00993153541581
.173417233802398	2.30254714344461	10.4302238057269	3.02124344712199
.172809115561959	2.31053114829281	10.511349213338	3.03255279799434

QL=7

Qts	H (F_B/F_S)	Alpha	F_3/F_S
.681996593192959	.621725071187902	.205654584752405	.53452301847904
.623074242438428	.66136737946087	.251263511240999	.570328757073305
.579699248145965	.699600880805753	.299632326081471	.606773651344563
.546490211309188	.736400232283412	.351670671968018	.643629501678024
.520214934092855	.771613774127986	.407747962098291	.680662000475855
.498831736038837	.805068738207423	.467920403634416	.717668234128911
.480999610008485	.836615784624053	.532047280185874	.754485814324778
.465809859122154	.866146033175375	.599857956876885	.790991063208091
.452630772928571	.893595018993387	.670995026478913	.827093526225407
.441013648597216	.918940382194475	.74504487668047	.862729808026822
.430633809933808	.942196703093741	.821560902753182	.897857864344303
.421252440722441	.963409265229713	.900081848747631	.932452094636635
.412691240230153	.98264769759353	.980146491780325	.966499301429356
.404815219201977	1.00000000000167	1.0613053061245	.999995215084631
.392766147102884	1.02705224635074	1.1970980426974	1.05444723281746
.389754208251509	1.03410139041239	1.23300466767176	1.06852545560869
.386785649893798	1.04116610272246	1.26921050755714	1.08257250558765
.383859604708871	1.04824596013316	1.30571569629524	1.09658259852287
.38097522610082	1.05534055476025	1.34252036159708	1.11055003570722
.378131687687915	1.06244949330168	1.37962462528687	1.12447009707256
.375328182800502	1.06957239639232	1.41702860362409	1.13833900856368
.372563923987935	1.07670889799237	1.45473240760524	1.15215480372587
.369838142534853	1.08385864480768	1.49273614324685	1.16591372730091
.367150087987007	1.09102129573983	1.53103991185085	1.17961557253529
.364499027686828	1.09819652136439	1.56964381025376	1.19325920244795
.361884246318844	1.10538400343563	1.60854793106061	1.20684432082877
.359305045465038	1.11258343441612	1.64775236286483	1.22037058382561
.356760743170166	1.11979451702984	1.68725719045491	1.23383760252941
.354250673517072	1.12701696383737	1.72706249500877	1.24724666884039
.351774186211942	1.13425049683198	1.76716835427677	1.2605972887597
.349330646179475	1.14149484705544	1.80757484275388	1.27389149498378
.346919433167876	1.14874975423233	1.84828203184202	1.28713039290639
.344539941363593	1.15601496642198	1.88928999000294	1.30031333433108
.342191579015685	1.16329023968692	1.93059878290241	1.31344302088059
.339873768069687	1.17057533777706	1.9722084735463	1.3265203940873
.337585943810846	1.17787003182865	2.01411912240891	1.33954634757758
.335327554516573	1.18517410007726	2.05633078755424	1.35252172991935
.333098061117961	1.19248732758399	2.09884352475049	1.36544901301207
.330896936870194	1.19980950597435	2.14165738757829	1.37832811660488
.328723667031685	1.20714043318887	2.18477242753305	1.39116183065493
.326577748551768	1.2144799132451	2.22818869412173	1.40395040961626

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.324458689766764	1.22182775601022	2.27190623495445	1.41669531469031
.322366010104233	1.22918377698384	2.31592509583122	1.42939796706255
.320299239795246	1.23654779709033	2.36024532082407	1.44205934138999
.318257919594471	1.24391964248034	2.40486695235485	1.45468078916616
.316241600507911	1.25129914434087	2.44979003126901	1.46726322165577
.31424984352809	1.25868613871372	2.49501459690557	1.47980873950443
.312282219376522	1.26608046632157	2.5405406871634	1.49231738230323
.310338308253262	1.27348197240159	2.58636833856427	1.50479038438831
.308417699593381	1.28089050654606	2.63249758631257	1.51722935574984
.306519991830161	1.28830592254972	2.67892846435213	1.52963507394301
.30464479216486	1.29572807826347	2.72566100542011	1.54200829638198
.302791716342848	1.30315683545421	2.77269524109831	1.55435016117306
.300960388435969	1.31059205967032	2.82003120186187	1.56666138591761
.299150440630937	1.31803362011282	2.86766891712566	1.57894306924059
.297361513023617	1.32548138951165	2.91560841528836	1.59119629028546
.295593253419024	1.33293524400701	2.96384972377445	1.60342171335093
.29384531713688	1.34039506303541	3.01239286907418	1.61561998842603
.292117366822578	1.34786072922031	3.0612378767816	1.62779214674024
.290409072263396	1.35533212826708	3.1103847716309	1.63993880951089
.288720110209817	1.3628091488621	3.15983357753089	1.65206058578274
.287050164201811	1.37029168257575	3.20958431759801	1.66415846565729
.285398924399932	1.37777962376926	3.25963701418771	1.6762330334914
.283766087421099	1.38527286950507	3.30999168892448	1.68828486325812
.282151356178918	1.3927713194607	3.3606483627304	1.70031451904372
.280554439728428	1.40027487584583	3.41160705585249	1.7123229454578
.278975053115127	1.40778344332259	3.46286778788878	1.72431049164238
.277412917228165	1.41529692892881	3.51443057781317	1.73627769385985
.275867758657579	1.4228152420041	3.56629544399931	1.74822508026253
.274339309555457	1.43033829411881	3.61846240424325	1.76015355875695
.272827307500904	1.43786599900544	3.67093147578525	1.77206306028438
.271331495368722	1.44539827249271	3.72370267533052	1.78395447807809
.269851621201665	1.45293503244197	3.77677601906916	1.79582831061084
.268387438086198	1.46047619868591	3.83015152269513	1.80768504997741
.266938704031627	1.46802169296952	3.8838292014245	1.8195247974621
.265505181852522	1.47557143889311	3.93780907001288	1.83134841900722
.264086639054332	1.48312536185742	3.9920911427721	1.84315600551268
.262682847722088	1.49068338901062	4.04667543358621	1.85494802775117
.261293584412121	1.49824544919723	4.10156195592681	1.86672514271244
.259918630046695	1.50581147290875	4.1567507228677	1.878487428166
.258557769811467	1.5133813922361	4.212241747099	1.89023534084659
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.255877493195174	1.52853265382474	4.32413061635524	1.91368966197057
.254557667617608	1.53611386785904	4.38052848496064	1.92539658204685
.253251117590701	1.54369872097093	4.43722865804172	1.93709053424546
.251957648172548	1.55128715258955	4.49423114656187	1.94877195577185
.250677068124444	1.5588791034902	4.55153596117399	1.96044090098309
.249409189825999	1.56647451575691	4.609143112231	1.97209780108854
.248153829239809	1.57407333336065	4.66705261121356	1.98374289507675
.2469108056362	1.5816754996017	4.72526446492593	1.99537641823016
.245679941815799	1.58928096096479	4.78377868445559	2.00699879347063
.244461063826236	1.59688966441869	4.84259527905165	2.01861006301127
.243254000941276	1.6045015580718	4.90171425771022	2.03021064445454
.242058585588408	1.61211659114158	4.96113562918267	2.041800764306
.240874653278307	1.61973471392494	5.02085940198366	2.05338064704423
.239702042536118	1.62735587776952	5.08088558439879	2.0649505152
.23854059483452	1.63498003504598	5.14121418449197	2.0765104955703
.23739015452849	1.64260713912112	5.20184521011258	2.08806090104352
.236250568791752	1.65023714433178	5.26277866890227	2.0996020424399
.235121687554841	1.65787000595969	5.32401456830158	2.11113394774848
.234003363444745	1.665505680207	5.38555291555627	2.12265692460869
.232895451726077	1.67314412417261	5.44739371772343	2.13417109188597
.231797810243737	1.68078529582922	5.50953698167741	2.14567656727216
.230710299367014	1.68842915400109	5.57198271411544	2.15717374724525
.229632781935105	1.69607565834247	5.63473092156315	2.16866265337926
.228565123203982	1.70372476931667	5.69778161037982	2.18014349282965
.227507190794604	1.71137644817582	5.76113478676346	2.19161647146841
.226458854642409	1.71903065694116	5.82479045675576	2.20308179393205
.225419986948059	1.726687358384	5.88874862624676	2.21453947777156
.224390462129411	1.73434651600714	5.95300930097945	2.22598972569659
.223370156774667	1.74200809402697	6.01757248655418	2.23743264648723
.222358949596681	1.74967205735598	6.08243818843289	2.24886853360667
.22135672138838	1.75733837158585	6.14760641194323	2.26029740116885
.220363354979286	1.76500700297103	6.21307716228251	2.2717194480379
.219378735193083	1.77267791841276	6.27885044452154	2.28313477954811
.218402748806227	1.78035108544357	6.34492626360832	2.29454350034243
.21743528450755	1.78802647221226	6.41130462437159	2.30594580683149
.216476232858844	1.79570404746923	6.47798553152431	2.31734180216882
.215525486256394	1.80338378055232	6.54496898966697	2.32873158889245
.214582938893425	1.81106564137295	6.61225500329082	2.3401152689465
.21364848672346	1.81874960040277	6.679843576781	2.35149294370176
.21272202742454	1.82643562866057	6.74773471441949	2.36286480612153
.2118034603643	1.83412369769963	6.8159284203881	2.37423086423306

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.210892686565869	1.84181377959538	6.88442469877123	2.38559130984295
.209989608674579	1.84950584693343	6.9532235535586	2.3969462420631
.209094130925453	1.85719987279791	7.02232498864792	2.40829566759915
.208206159111457	1.86489583076014	7.09172900784738	2.41963986854009
.207325600552496	1.8725936948676	7.16143561487817	2.43097871289447
.206452364065128	1.88029343963321	7.23144481337683	2.44231243585852
.205586359932991	1.88799504002488	7.30175660689759	2.45364108845537
.2047274998779	1.89569847145537	7.37237099891458	2.4649648130849
.203875697031628	1.90340370977241	7.44328799282402	2.4762836142166
.203030865908322	1.91111073124904	7.51450759194629	2.48759767930321
.202192922377562	1.91881951257431	7.586029799528	2.49890701217329
.20136178363803	1.92653003084411	7.65785461874391	2.51021166223689
.200537368191778	1.93424226355228	7.72998205269891	2.52151177009981
.199719595819091	1.94195618858203	7.80241210442977	2.53280743024767
.198908387553902	1.94967178419746	7.87514477690702	2.54409869117057
.19810366565978	1.95738902903537	7.94818007303665	2.55538564679512
.197305353606445	1.9651079020973	8.02151799566179	2.56666829947999
.196513376046817	1.97282838274168	8.09515854756433	2.57794678830588
.195727658794573	1.98055045067633	8.16910173146655	2.5892211608023
.194948128802213	1.98827408595099	8.2433475500326	2.60049150988239
.194174714139599	1.99599926895016	8.31789600587003	2.61175788264378
.193407343972987	2.00372598038605	8.39274710153123	2.62302032600937
.192645948544504	2.01145420129176	8.46790083951478	2.63427893224543
.191890459152092	2.01918391301458	8.5433572222669	2.64553374788426
.191140808129881	2.02691509720951	8.61911625218267	2.65678481930182
.190396928828998	2.03464773583288	8.69517793160741	2.66803223817755
.18965875559879	2.04238181113619	8.77154226283785	2.67927605053403
.188926223768459	2.05011730566005	8.84820924812335	2.69051630225403
.18819926962909	2.05785420222831	8.92517888966712	2.70175308448445
.187477830416072	2.06559248394229	9.0024511896273	2.71298639740701
.186761844291895	2.07333213417522	9.0800261501181	2.72421628651302
.186051250329315	2.08107313656671	9.15790377321084	2.73544288786384
.185345988494883	2.08881547501746	9.23608406093507	2.74666620127808
.18464599963282	2.09655913368403	9.31456701527947	2.75788627184289
.18395122544924	2.10430409697375	9.39335263819295	2.76910314453631
.183261608496703	2.1120503495398	9.47244093158551	2.780316864231
.182577092159097	2.11979787627628	9.55183189732925	2.7915275209596
.181897620636841	2.12754666231356	9.63152553725923	2.80273515934575
.181223138932389	2.13529669301363	9.71152185317434	2.8139397334598
.180553592836048	2.14304795396559	9.7918208468382	2.82514137826321
.17988892891209	2.15080043098121	9.87242251997996	2.83634013810595

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.179229094485144	2.15855411009071	9.9533268742951	2.84753596688749
.178574037626883	2.16630897753845	10.0345339114463	2.85872899921777
.177923707142978	2.17406501977893	10.1160436330639	2.86991927919985
.177278052560321	2.18182222347269	10.1978560407473	2.88110676058484
.176637024114516	2.18958057548245	10.2799711360649	2.89229153253668
.176000572737622	2.19734006286923	10.3623889205553	2.90347368408789
.175368650046143	2.20510067288866	10.4451093957279	2.91465316886093
.174741208329274	2.21286239298727	10.5281325630634	2.92583003068522
.174118200537372	2.22062521079895	10.6114584240147	2.93700435839013
.173499580270669	2.22838911414144	10.6950869800074	2.94817619563343
.172885301768211	2.2361540910129	10.7790182324403	2.9593454959346
.172275319897017	2.2439201295886	10.8632521826862	2.97051234793803
.171669590141459	2.25168721821761	10.9477888320924	2.98167679516427
.17106806859285	2.25945534541966	11.0326281819813	2.99283888107823
.170470711939244	2.26722449988196	11.1177702336509	3.00399855911959

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.660226948124887	.640741967624677	.267514222349104	.542636255435048
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.564680307461119	.712869615583236	.364254166960818	.612500703702645
.533357279066539	.747564621524382	.419074541273622	.648490105463806
.508463752161986	.780975870838636	.47838676516508	.684778833725851
.48813042615229	.812853992200371	.542051333975727	.721129917956187
.471121043341749	.843003260714678	.609796464412029	.757360548759085
.456593538112776	.871285542380694	.681260817024473	.793334370731525
.443960174768235	.897616988623879	.75602322070645	.828952763504678
.432802157864605	.921961554741133	.833625277590159	.864146829677333
.422815662421284	.944323398027233	.913589505566736	.8988706005815
.413776715252066	.964739217426937	.995434220612669	.933095481132758
.405517771539906	.983271080222164	1.078685712382	.966805821941204
.397911759088753	1.00000000000235	1.16288800000301	.999995215084969
.386261806371254	1.02610843013224	1.30361322755466	1.05396262595063
.38334705307869	1.03291699476584	1.34082001963936	1.06791336887818
.380473279006804	1.03974269786627	1.3783352656642	1.08183224618898
.37763969238808	1.04658508656539	1.41615914143262	1.09571352431731
.374845519441177	1.05344372384984	1.45429181489472	1.109551555631
.372090003966611	1.06031818787427	1.49273344656395	1.12334167056833
.369372406947087	1.06720807130988	1.53148418990833	1.13708014451455
.366692006152951	1.07411298072604	1.57054419171792	1.15076505786455
.364048095753168	1.08103253600313	1.60991359245022	1.16439270343022
.361439985932174	1.08796636977482	1.64959252655501	1.17796291717705
.358867002512889	1.09491412689802	1.6895811227799	1.19147460452045
.356328486586138	1.10187546394897	1.72987950445798	1.20492750901578
.353823794146667	1.10885004874397	1.77048778977879	1.2183213251083
.351352295735922	1.11583755988336	1.8114060920435	1.23165570080069
.348913376091705	1.12283768631746	1.85263451990564	1.24493196039801
.346506433804796	1.12985012693326	1.89417317759802	1.25814964386818
.344130880982613	1.13687459016069	1.93602216514689	1.27131081153473
.341786142919923	1.14391079359739	1.97818157857417	1.2844165963694
.339471657776648	1.15095846365109	2.02065151008834	1.29746637997764
.337186876262729	1.15801733519849	2.06343204826493	1.3104628851962
.334931261330044	1.16508715125986	2.10652327821703	1.32340707691058
.332704287871335	1.17216766268847	2.14992528175665	1.33629987085171
.330505442426077	1.17925862787418	2.19363813754732	1.34914213651339
.328334222893252	1.18635981246026	2.23766192124851	1.36193636132271
.326190138250918	1.19347098907296	2.2819967056525	1.3746824856668
.324072708282517	1.20059193706301	2.32664256081387	1.38738331150297
.32198146330981	1.20772244225853	2.37159955417241	1.40003911074079

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.317875700773368	1.22201129855796	2.46244721285846	1.42522148586944
.31586029423203	1.22916925162922	2.50833800100957	1.43775048217125
.313869294241823	1.23633596541734	2.55454017320927	1.45023970850338
.311902280035093	1.24351125479068	2.60105378545476	1.46269008688952
.30995883991353	1.25069493982121	2.64787889174363	1.47510372413706
.308038571024502	1.2578868456027	2.69501554415918	1.48748067160503
.306141079143121	1.26508680207633	2.74246379295141	1.49982217092412
.304265978459913	1.27229464386362	2.79022368661407	1.51212983732573
.30241289137397	1.27951021010612	2.83829527195804	1.52440445560796
.300581448291459	1.28673334431177	2.88667859418102	1.53664678988032
.298771287429365	1.29396389420736	2.93537369693398	1.5488579830124
.296982054624353	1.30120171159704	2.9843806223844	1.5610387582315
.29521340314661	1.30844665222636	3.0336994112765	1.57319021787285
.29346499351857	1.31569857565189	3.08333010298865	1.58531344427535
.291736493338383	1.32295734511578	3.13327273558811	1.59740910593076
.290027577108018	1.33022282742544	3.18352734588318	1.60947785662713
.288337926065887	1.33749489283777	3.23409396947299	1.62152072949753
.28666722802387	1.3447734149479	3.28497264079497	1.63353834877798
.28501517720863	1.35205827058229	3.33616339317022	1.64553132619616
.28338147410711	1.35934933969578	3.38766625884671	1.65750065264665
.281765825316101	1.36664650527269	3.43948126904066	1.66944691449925
.280167943395771	1.37394965323158	3.49160845397599	1.68137068745358
.278587546727061	1.38125867233355	3.54404784292208	1.69327253705026
.277024359372832	1.38857345409406	3.59679946422977	1.70515340746177
.275478110942676	1.39589389269792	3.64986334536591	1.71701364955908
.27394853646128	1.4032198849175	3.70323951294627	1.7288538002992
.27243537624026	1.41055133003381	3.75692799276715	1.74067438830732
.270938375753363	1.41788812976062	3.8109288098355	1.75247632006184
.269457285514945	1.42523018817115	3.86524198839789	1.76425952908
.267991860961645	1.43257741162753	3.91986755196811	1.7760249067693
.266541862337155	1.43992970871271	3.97480552335375	1.7877729512721
.265107054580012	1.44728699016481	4.0300559246815	1.79950415418076
.263687207214323	1.45464916881379	4.08561877742153	1.81121861786985
.262282094243346	1.46201615952032	4.1414941024108	1.8229172057288
.260891494045844	1.46938787911684	4.1976819198754	1.83460000946822
.259515189275143	1.47676424635059	4.254182249452	1.84626749878584
.258152966760807	1.48414518182868	4.3109951102084	1.85792032855857
.256804617412869	1.49153060796496	4.36812052066327	1.86955857701622
.255469936128549	1.49892044892882	4.42555849880509	1.88118269944961
.254148721701375	1.50631463059559	4.48330906211031	1.89279314650852

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.252840776732655	1.51371308049872	4.5413722275608	1.904390174895
.251545907545229	1.52111572778351	4.59974801166063	1.91597403796149
.250263924099437	1.52852250316242	4.65843643045214	1.92754517491207
.248994639911249	1.5359333388718	4.71743749953144	1.93910402100764
.247737871972482	1.54334816863011	4.77675123406324	1.95065063046191
.246493440673062	1.55076692759749	4.8363776487952	1.96218543239023
.245261169725266	1.55818955233664	4.89631675807158	1.97370866417237
.244040886089891	1.56561598077498	4.95656857584653	1.98522056062354
.242832419904295	1.57304615216801	5.01713311569679	1.99672154192689
.24163560441226	1.58048000706388	5.07801039083386	2.00821164985882
.240450275895629	1.58791748726907	5.13920041411584	2.01969129960011
.239276273607665	1.59535853581516	5.20070319805872	2.03116071614798
.238113439708077	1.60280309692665	5.26251875484728	2.04262012242668
.236961619199689	1.6102511159898	5.32464709634561	2.0540697393691
.235820659866679	1.61770253952242	5.38708823410722	2.06550969263039
.234690412214368	1.62515731514466	5.44984217938474	2.07694029292796
.233570729410503	1.6326153915506	5.51290894313938	2.08836184886538
.232461467227994	1.64007671848082	5.57628853604991	2.09977438768282
.231362483989076	1.64754124669576	5.63998096852141	2.1111782147374
.230273640526463	1.65500892817752	5.70398625128785	2.12257344773442
.229194800065946	1.66247971516981	5.76830439298264	2.13396020273083
.228125828273895	1.66995356159538	5.83293540390009	2.14533887348484
.227066593138402	1.67743042204326	5.89787929343103	2.15670948070059
.226016964937608	1.68491025200077	5.9631360707318	2.16807222962306
.224976816191594	1.69239300783135	6.02870574473124	2.17942732419024
.22394602161543	1.69987864675306	6.0945883241375	2.19077496708254
.222924458073366	1.70736712681767	6.16078381744454	2.20211517491708
.221912004534127	1.71485840689039	6.22729223293845	2.2134481484181
.220908542027283	1.72235244663019	6.29411357870358	2.22477399488683
.219913953600674	1.72984920647063	6.36124786262837	2.23609300524345
.218928124278845	1.73734864760138	6.42869509241109	2.24740519262129
.217950941022477	1.74485073195009	6.49645527556529	2.25871075384163
.216982292688785	1.75235542216496	6.56452841942517	2.27000979271341
.216022069992856	1.75986268159766	6.63291453115062	2.2813024123473
.215070165469899	1.76737247428679	6.7016136177323	2.29258880708003
.214126473438387	1.77488476494186	6.77062568599633	2.30386907851613
.213190889964072	1.7823995189276	6.839950742609	2.31514332763988
.21226331282483	1.78991670224881	6.90958879408121	2.32641165483733
.211343641476348	1.79743628153559	6.97953984677285	2.33767415991762
.210431777018591	1.80495822402896	7.04980390689698	2.34893103373579
.209527622163067	1.81248249756694	7.12038098052387	2.36018228329193

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.208631081200834	1.82000907057091	7.19127107358499	2.37142809827664
.207742059971263	1.82753791203244	7.26247419187676	2.38266857622601
.206860465831507	1.83506899150044	7.33399034106428	2.39390372281811
.20598620762668	1.84260227906862	7.40581952668484	2.4051338174669
.205119195660715	1.85013774536334	7.47796175415145	2.4163587279791
.204259341667893	1.85767536153178	7.55041702875611	2.42757868714866
.203406558785013	1.86521509923039	7.62318535567312	2.43879374469831
.202560761524197	1.87275693061365	7.69626673996216	2.45000404117451
.201721865746318	1.88030082832319	7.76966118657138	2.46120958002823
.200889788635011	1.88784676547713	7.84336870034032	2.47241054658197
.200064448671288	1.89539471565968	7.91738928600278	2.48360694365112
.199245765608709	1.9029446529111	7.99172294818958	2.49479881935868
.198433660449111	1.91049655171786	8.06636969143126	2.50598631246484
.197628055418886	1.91805038700305	8.14132952016067	2.51716951589136
.196828873945774	1.92560613411704	8.21660243871551	2.52834847684962
.196036040636181	1.93316376882842	8.29218845134076	2.53952328770922
.195249481252993	1.94072326731511	8.36808756219108	2.55069394984255
.19446912269388	1.94828460615575	8.44429977533309	2.56186060049799
.193694892970077	1.95584776232126	8.52082509474762	2.57302328594374
.192926721185629	1.96341271316667	8.59766352433188	2.58418209755146
.192164537517088	1.97097943642307	8.67481506790158	2.595337081167
.191408273193658	1.97854791018986	8.75227972919293	2.6064882824673
.190657860477762	1.9861181129271	8.83005751186467	2.61763579219101
.189913232646036	1.99369002344815	8.90814841949999	2.62877965563454
.189174323970731	2.00126362091237	8.98655245560838	2.63991991794404
.188441069701514	2.0088388848181	9.06526962362745	2.651056669286
.187713406047665	2.01641579499578	9.14429992692473	2.66218995446372
.186991270160642	2.0239943316012	9.22364336879932	2.67331981814695
.186274600117034	2.03157447510898	9.30329995248366	2.68444634998493
.185563334901861	2.03915620630616	9.383269681145	2.69556954924861
.18485741439224	2.04673950628595	9.46355255788713	2.70668946023506
.184156779341389	2.05432435644164	9.54414858575178	2.71780621723293
.183461371362971	2.06191073846068	9.62505776772019	2.7289198191691
.182771132915762	2.06949863431881	9.70628010671451	2.74003030995395
.182086007288648	2.07708802627447	9.78781560559922	2.75113773339517
.181405938585929	2.08467889686318	9.8696642671825	2.76224213320144
.180730871712931	2.09227122889223	9.95182609421754	2.77334359795297
.180060752361916	2.09986500543531	10.0343010894038	2.78444217112079
.179395526998283	2.10746020982739	10.1170892553885	2.79553780622056
.178735142847056	2.11505682565972	10.2001905947673	2.80663063648424
.178079547879648	2.12265483677484	10.2836051100862	2.81772070512835

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.177428690800896	2.13025422726182	10.367332803842	2.82880796551961
.176782521036362	2.13785498145156	10.4513736784841	2.83989255055472
.176140988719893	2.14545708391217	10.535727736415	2.85097450322239
.175504044681432	2.15306051944451	10.6203949799916	2.86205377676265
.174871640435081	2.16066527307782	10.7053754115265	2.87313045894139
.174243728167397	2.16827133006538	10.7906690332885	2.88420463739758
.173620260725932	2.17587867588039	10.8762758475041	2.89527626526403
.173001191607999	2.18348729621183	10.9621958563579	2.9063453852897
.172386474949661	2.19109717696046	11.048429061994	2.91741208492904
.171776065514945	2.19870830423492	11.1349754665169	2.92847640677038
.17116991868527	2.20632066434791	11.221835071992	2.93953830387283
.170567990449079	2.2139342438124	11.3090078804467	2.95059786352416
.169970237391681	2.22154902933805	11.3964938938714	2.96165512819495
.169376616685295	2.22916500782753	11.4842931142199	2.97271014030617
.168787086079288	2.23678216637311	11.5724055434107	2.98376285286561

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.637012289031104	.660493751592592	.341738541589273	.550936541724468
.586215329915689	.693759641417494	.389966069083472	.584128506012317
.548280548371445	.726890176357428	.443332411134539	.61849463904867
.518913979907074	.75942128561924	.501788406005412	.653612526442927
.495470967985627	.790955632725561	.565124252655409	.689140195177008
.476250523316996	.821176424259924	.633021733983178	.724812172806818
.460120391975189	.849846598230782	.705086397260313	.760428388578517
.446305535761231	.876801658019909	.780870609687328	.795841711572625
.434262919415257	.901940049304045	.859891996046632	.830946547432026
.423604409282534	.925212995660722	.941649102738733	.865669262731004
.414047711445392	.946614729525806	1.02563495900906	.89996046167386
.405384274958613	.966173567923776	1.11134872692002	.933788875182904
.397457792472637	.983944023389471	1.19830546368959	.967136602590518
.390149505291066	1.00000000000334	1.28604400000451	.999995215085466
.378940812230072	1.0250873051347	1.43249728890618	1.05343807345904
.376133714440439	1.03163515969408	1.47121330829413	1.06725053063789
.37336501473478	1.03820169094321	1.5102482485571	1.0810302549124
.37063399927464	1.04478642056703	1.54960233604898	1.09477157025161
.367939969534167	1.05138888645953	1.5892757874544	1.10846888701364
.365282241991843	1.05800864204377	1.6292688102798	1.12211759302098
.362660147823691	1.06464525562572	1.66958160331581	1.13571401989372
.3600730325985	1.07129830978	1.71021435707266	1.14925630145274
.357520255975524	1.07796740076574	1.75116725419049	1.16274078525944
.355001191405063	1.08465213797084	1.79244046982618	1.17616735621366
.352515225832291	1.09135214338299	1.83403417201819	1.18953496830344
.35006175940463	1.09806705108608	1.8759485220309	1.20284341078382
.347640205182963	1.1047965067804	1.91818367467964	1.21609242218589
.345249988856888	1.11154016732559	1.96073977863774	1.22928169307087
.342890548464237	1.11829770030487	2.00361697672667	1.24241258537521
.340561334115012	1.12506878360949	2.0468154061903	1.25548467837029
.338261807719887	1.13185310504238	2.09033519895433	1.26850006475245
.335991442723369	1.13865036193986	2.13417648187178	1.28145990977813
.33374972384174	1.14546026081055	2.17833937695535	1.2943636297274
.331536146805817	1.15228251699055	2.22282400159744	1.30721397271889
.329350218108599	1.15911685431397	2.26763046877865	1.3200119312118
.327191454757835	1.16596300479821	2.31275888726537	1.33275844711146
.325059384033522	1.17282070834295	2.35820936179713	1.34545441476216
.322953543250344	1.17968971244249	2.40398199326432	1.35810234051097
.320873479525051	1.18656977191041	2.45007687887677	1.37070218920059
.318818749548746	1.19346064861621	2.49649411232393	1.38325677777398
.316788919364072	1.20036211123326	2.54323378392676	1.39576639904012

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.314783564147248	1.20727393499732	2.59029598078229	1.40823254354562
.312802267994916	1.21419590147545	2.63768078690072	1.42065665965513
.310844623715756	1.22112779834446	2.68538828333603	1.43303974971126
.30891023262681	1.22806941917869	2.73341854830997	1.44538318853888
.306998704354448	1.23502056324649	2.78177165733019	1.45768791154023
.305109656639925	1.24198103531512	2.83044768330255	1.46995603383222
.303242715149452	1.24895064546361	2.8794466966381	1.4821876211757
.301397513288716	1.25592920890319	2.92876876535497	1.49438392467094
.299573692021767	1.26291654580493	2.97841395517537	1.5065465667318
.29777089969421	1.26991248113432	3.02838232961814	1.51867634149111
.295988791860612	1.27691684449244	3.07867395008687	1.53077402175671
.294227031116049	1.28392946996331	3.129288875954	1.54284075694396
.292485286931719	1.29095019596733	3.18022716464103	1.55487727773469
.290763235494534	1.29797886512038	3.23148887169503	1.56688469178442
.289060559550612	1.3050153240984	3.28307405086171	1.57886408615278
.287376948252589	1.31205942350713	3.33498275415519	1.59081613511172
.285712097010671	1.31911101775693	3.38721503192455	1.60274149776483
.284065707347336	1.32616996494226	3.43977093291754	1.61464121044987
.282437486755626	1.33323612672577	3.4926505043414	1.62651590179867
.280827148560921	1.34030936822669	3.54585379192096	1.63836618753598
.279234411786141	1.34738955791345	3.59938083995426	1.65019306044955
.277659001020281	1.35447656750022	3.65323169136575	1.66199711011139
.276100646290213	1.36157027184728	3.70740638775714	1.67377891508075
.274559082935664	1.36867054886507	3.76190496945611	1.6855390434314
.273034051487308	1.37577727942167	3.81672747556291	1.69727843976461
.271525297547894	1.38289034725367	3.87187394399499	1.70899745773242
.270032571676328	1.39000963888028	3.92734441152977	1.72069663591153
.268555629274646	1.39713504352038	3.98313891384558	1.73237650427836
.267094230477808	1.4042664530127	4.0392574855609	1.74403796854892
.265648140046231	1.41140376173867	4.09570016027202	1.7556809658551
.264217127261009	1.41854686654803	4.15246697058905	1.76730638635828
.262800965821741	1.42569566668707	4.20955794817058	1.77891472857559
.261399433746905	1.43285006372933	4.26697312375681	1.79050648426332
.260012313276712	1.44000996150866	4.32471252720142	1.80208175769074
.258639390778386	1.44717526605468	4.38277618750213	1.8136414101146
.25728045665379	1.45434588553029	4.44116413283003	1.82518553479271
.255935305249357	1.46152173017147	4.49987639055772	1.83671460087648
.254603734768256	1.46870271222897	4.55891298728644	1.84822926153533
.253285547184735	1.47588874591202	4.61827394887195	1.85972959610511
.251980548160594	1.48307974733396	4.67795930044961	1.87121605886943
.250688546963719	1.49027563445954	4.73796906645831	1.88268909932448

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.249409356388637	1.49747632705413	4.79830327066357	1.89414897389815
.248142792679029	1.50468174663447	4.85896193617972	1.90559593556009
.246888675452163	1.51189181642107	4.91994508549122	1.91703042199678
.245646827625174	1.51910646129215	4.98125274047322	1.92845286682899
.244417075343173	1.52632560773911	5.04288492241126	1.93986332459981
.243199247909109	1.53354918382334	5.1048416520203	1.95126222259071
.24199317771536	1.54077711913449	5.16712294946302	1.96264979729472
.240798700176991	1.54800934475004	5.2297288343674	1.97402628256013
.239615653666649	1.55524579319613	5.2926593258437	1.98539209646097
.238443879451039	1.56248639840967	5.35591444250078	1.99674728071248
.237283221628955	1.56973109570154	5.41949420246184	2.00809224823386
.236133527070809	1.57697982172108	5.4833986233796	2.01942722275553
.234994645359628	1.58423251442153	5.54762772245084	2.03075242587267
.233866428733484	1.59148911302661	5.6121815164306	2.04206807712985
.23274873202931	1.59874955799817	5.67706002164562	2.05337430128606
.231641412628066	1.60601379100469	5.74226325400755	2.0646714070168
.230544330401236	1.61328175489088	5.80779122902551	2.07595970082275
.229457347658595	1.62055339364811	5.87364396181829	2.08723920945068
.228380329097238	1.62782865238573	5.9398214671261	2.09851023606268
.227313141751818	1.63510747730331	6.00632375932192	2.10977289709084
.226255654945977	1.64238981566364	6.07315085242242	2.12102730773999
.22520774024493	1.64967561576656	6.14030276009856	2.13227385871954
.224169271409168	1.65696482692352	6.20777949568578	2.14351257006182
.22314012434927	1.66425739943297	6.27558107219384	2.15474364518285
.222120177081767	1.67155328455639	6.34370750231633	2.16596728615752
.22110930968606	1.67885243449502	6.41215879843991	2.17718369377079
.220107404262337	1.68615480236731	6.48093497265314	2.18839288386546
.219114344890488	1.69346034218697	6.55003603675509	2.19959505522297
.218130017589976	1.70076900884169	6.61946200226361	2.21079031375386
.217154310280639	1.7080807580724	6.68921288042339	2.22197894780509
.216187112744416	1.71539554645323	6.75928868221368	2.23316096965587
.215228316587948	1.72271333137187	6.82968941835581	2.24433657409334
.214277815206058	1.73003407101066	6.90041509932041	2.25550586345753
.213335503746061	1.73735772432807	6.97146573533446	2.26666893937645
.212401279072906	1.74468425104076	7.04284133638805	2.27782599409949
.211475039735116	1.75201361160616	7.11454191224096	2.28897712771806
.210556685931503	1.75934576720543	7.18656747242901	2.30012243969233
.209646119478654	1.76668067972699	7.25891802627022	2.31126202887407
.208743243781822	1.7740183117962	7.33159358300982	2.32239599355865
.207847963792861	1.78135862657176	7.40459415125506	2.33352452238478
.206960185996893	1.7887015880205	7.47791973986072	2.3446476214231

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.204340952838332	1.81074600115843	7.69984671193923	2.37798575749374
.203482278102577	1.81809920115275	7.77447246515642	2.38908846133605
.202630659823791	1.82545487679918	7.84942327940702	2.4001861679095
.201786013031409	1.83281299567822	7.92469916229526	2.4112791074967
.20094825408526	1.84017352593514	8.00030012125937	2.42236732852375
.200117300650242	1.84753643626767	8.07622616357588	2.43345096962462
.199293071671558	1.85490169591403	8.15247729636388	2.44453003325755
.198475487350503	1.86226927464137	8.22905352658907	2.45560470251857
.197664469120777	1.86963914273435	8.30595486106769	2.46667497922884
.196859939625326	1.87701127098417	8.38318130647041	2.47774091021062
.196061822693679	1.88438563067775	8.46073286932603	2.48880263230169
.195270043319787	1.89176219358726	8.53860955602507	2.49986023680978
.194484527640345	1.89914093195991	8.61681137282331	2.51091376964454
.193705202913575	1.90652181850796	8.69533832584517	2.52196332156261
.192931997498481	1.91390482639904	8.77419042108701	2.53300889295216
.192164840834541	1.92128992924661	8.85336766442035	2.54405061913764
.191403663421838	1.9286771011008	8.93287006159498	2.55508854509264
.190648396801623	1.93606631643936	9.01269761824196	2.56612276058103
.189898973537287	1.94345755015888	9.09285033987658	2.57715331015893
.189155327195742	1.9508507775662	9.17332823190119	2.58818023821729
.188417392329195	1.9582459743701	9.25413129960801	2.59920363389419
.187685104457315	1.9656431166731	9.33525954818174	2.61022354120609
.18695840004977	1.97304218096352	9.41671298270225	2.62124000402333
.186237216509138	1.98044314410769	9.49849160814708	2.63225311092063
.18552149215417	1.98784598334242	9.58059542939393	2.64326290543247
.184811166203415	1.99525067626756	9.66302445122303	2.65426943096432
.184106178759176	2.0026572008388	9.74577867831949	2.66527277558371
.183406470791808	2.0100655353606	9.82885811527557	2.67627293762782
.182711984124341	2.01747565847934	9.91226276659287	2.68726996014384
.18202266141742	2.02488754917658	9.99599263668446	2.69826397552764
.181338446154555	2.0323011867625	10.080047729877	2.70925498178725
.180659282627684	2.0397165508695	10.1644280504128	2.72024302159659
.17998511592302	2.04713362144595	10.2491336024517	2.73122813753208
.179315891907197	2.05455237875006	10.3341643900729	2.74221037207636
.178651557213698	2.06197280334391	10.4195204172772	2.75318981226214
.177992059229556	2.06939487608763	10.5052016879884	2.7641665003434
.177337346082329	2.0768185781337	10.5912082060553	2.77514038927993
.17668736662734	2.08424389092136	10.6775399752533	2.78611161044393
.176042070435168	2.09167079617121	10.7641969992862	2.79708020585121

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.1754014077794	2.09909927587985	10.8511792817877	2.80804612833218
.174765329624623	2.10652931231469	10.9384868263231	2.81900950893708
.17413378761466	2.11396088800891	11.0261196363907	2.82997038947046
.173506734061038	2.12139398575643	11.1140777154235	2.84092872265577
.172884121931691	2.1288285886071	11.2023610667905	2.85188459475742
.17226590483988	2.13626467986194	11.2909696937982	2.86283809191655
.17165203703334	2.14370224306851	11.379903599692	2.87378916676906
.171042473383639	2.15114126201633	11.4691627876574	2.88473786091061
.170437169375742	2.15858172073249	11.5587472608216	2.89568426031453
.169836081097787	2.16602360347729	11.6486570222546	2.9066284064256
.169239165231061	2.17346689473998	11.7388920749704	2.91757025183359
.168646379040163	2.18091157923462	11.8294524219283	2.92850988236185
.168057680363371	2.18835764189602	11.9203380660342	2.93944733935551
.167473027603187	2.19580506787576	12.0115490101415	2.9503826641156
.16689237971707	2.20325384253828	12.1030852570526	2.96131580920783