



Trigonometric Tables

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Degrees	Radians	$\sin(x)$	$\cos(x)$	$\tan(x)$	$\sec(x)$	$\csc(x)$	$\cot(x)$
0	0	0	1	0	1	INF	INF
1	0.01746	0.01746	0.99985	0.01746	1.00015	57.27377	57.26518
2	0.03492	0.03491	0.99939	0.03493	1.00061	28.64509	28.62761
3	0.05238	0.05236	0.99863	0.05243	1.00137	19.09855	19.07238
4	0.06984	0.06978	0.99756	0.06995	1.00245	14.33075	14.29579
5	0.0873	0.08719	0.99619	0.08752	1.00382	11.46921	11.42551
6	0.10476	0.10457	0.99452	0.10514	1.00551	9.56297	9.51057
7	0.12222	0.12192	0.99254	0.12283	1.00752	8.2021	8.14091
8	0.13968	0.13923	0.99026	0.1406	1.00984	7.18236	7.1124
9	0.15714	0.15649	0.98768	0.15845	1.01247	6.39018	6.31146
10	0.1746	0.17371	0.9848	0.1764	1.01543	5.75672	5.66922
11	0.19206	0.19088	0.98161	0.19446	1.01873	5.23889	5.14255
12	0.20952	0.20799	0.97813	0.21264	1.02236	4.80792	4.70277
13	0.22698	0.22504	0.97435	0.23096	1.02633	4.44365	4.32967
14	0.24444	0.24201	0.97027	0.24943	1.03064	4.13206	4.00921
15	0.2619	0.25892	0.9659	0.26806	1.0353	3.8622	3.7305
16	0.27937	0.27575	0.96123	0.28687	1.04033	3.62647	3.48587
17	0.29683	0.29249	0.95627	0.30587	1.04573	3.41892	3.26941
18	0.31429	0.30914	0.95102	0.32506	1.0515	3.23478	3.07634
19	0.33175	0.3257	0.94547	0.34448	1.05768	3.07031	2.90289
20	0.34921	0.34216	0.93964	0.36413	1.06424	2.92261	2.7462



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21	0.36667	0.35851	0.93353	0.38404	1.0712	2.78932	2.60392
22	0.38413	0.37475	0.92712	0.40421	1.07861	2.66845	2.47397
23	0.40159	0.39088	0.92044	0.42467	1.08644	2.55833	2.35479
24	0.41905	0.40689	0.91348	0.44543	1.09471	2.45767	2.24503
25	0.43651	0.42278	0.90623	0.46652	1.10347	2.3653	2.1435
26	0.45397	0.43854	0.89871	0.48796	1.11271	2.28029	2.04932
27	0.47143	0.45416	0.89092	0.50977	1.12244	2.20187	1.96169
28	0.48889	0.46965	0.88285	0.53196	1.1327	2.12925	1.8798
29	0.50635	0.48499	0.87452	0.55458	1.14348	2.0619	1.80317
30	0.52381	0.50018	0.86592	0.57763	1.15484	1.99928	1.73122
31	0.54127	0.51522	0.85706	0.60116	1.16678	1.94092	1.66348
32	0.55873	0.53011	0.84793	0.62518	1.17934	1.8864	1.59954
33	0.57619	0.54483	0.83854	0.64974	1.19255	1.83543	1.53909
34	0.59365	0.55939	0.8289	0.67485	1.20642	1.78766	1.48179
35	0.61111	0.57378	0.81901	0.70057	1.22099	1.74283	1.42739
36	0.62857	0.58799	0.80887	0.72693	1.23629	1.70071	1.37565
37	0.64603	0.60202	0.79848	0.75396	1.25238	1.66107	1.32633
38	0.66349	0.61587	0.78785	0.78171	1.26928	1.62372	1.27925
39	0.68095	0.62953	0.77698	0.81023	1.28703	1.58849	1.23422
40	0.69841	0.643	0.76587	0.83957	1.3057	1.55521	1.19109
41	0.71587	0.65627	0.75452	0.86979	1.32535	1.52376	1.14971
42	0.73333	0.66935	0.74295	0.90093	1.34599	1.49399	1.10996
43	0.75079	0.68222	0.73115	0.93307	1.36771	1.4658	1.07172



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44	0.76825	0.69488	0.71913	0.96628	1.39057	1.4391	1.0349
45	0.78571	0.70733	0.70689	1.00062	1.41465	1.41377	0.99938
46	0.80317	0.71956	0.69443	1.03619	1.44003	1.38974	0.96508
47	0.82063	0.73158	0.68176	1.07307	1.46679	1.3669	0.9319
48	0.8381	0.74337	0.66888	1.11138	1.49504	1.34523	0.89979
49	0.85556	0.75494	0.6558	1.15118	1.52486	1.32461	0.86868
50	0.87302	0.76627	0.64252	1.19261	1.55637	1.30502	0.8385
51	0.89048	0.77737	0.62904	1.23581	1.58972	1.28639	0.80919
52	0.90794	0.78824	0.61537	1.28092	1.62504	1.26865	0.78069
53	0.9254	0.79886	0.60152	1.32808	1.66246	1.25178	0.75297
54	0.94286	0.80924	0.58748	1.37749	1.70219	1.23573	0.72597
55	0.96032	0.81938	0.57326	1.42933	1.74441	1.22043	0.69963
56	0.97778	0.82926	0.55886	1.48383	1.78936	1.20589	0.67393
57	0.99524	0.83889	0.5443	1.54122	1.83722	1.19205	0.64883
58	1.0127	0.84826	0.52957	1.60179	1.88832	1.17888	0.6243
59	1.03016	0.85738	0.51468	1.66585	1.94295	1.16634	0.60029
60	1.04762	0.86624	0.49963	1.73374	2.00148	1.15441	0.57678
61	1.06508	0.87483	0.48443	1.80588	2.06428	1.14308	0.55374
62	1.08254	0.88315	0.46909	1.88271	2.13179	1.13231	0.53116
63	1.1	0.89121	0.4536	1.96476	2.20459	1.12207	0.50897
64	1.11746	0.89899	0.43797	2.05264	2.28326	1.11236	0.48718
65	1.13492	0.9065	0.4222	2.14706	2.36855	1.10314	0.46575
66	1.15238	0.91373	0.40631	2.24884	2.46117	1.09442	0.44467



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67	1.16984	0.92069	0.3903	2.35893	2.56213	1.08614	0.42392
68	1.1873	0.92736	0.37417	2.47848	2.67258	1.07833	0.40348
69	1.20476	0.93375	0.35792	2.60885	2.79392	1.07095	0.38331
70	1.22222	0.93986	0.34156	2.75167	2.92774	1.06399	0.36342
71	1.23968	0.94568	0.3251	2.9089	3.07598	1.05744	0.34377
72	1.25714	0.95121	0.30854	3.08296	3.24107	1.05129	0.32437
73	1.2746	0.95645	0.29188	3.27682	3.42607	1.04553	0.30517
74	1.29206	0.9614	0.27514	3.49422	3.63451	1.04015	0.28619
75	1.30952	0.96606	0.25831	3.73987	3.87132	1.03513	0.26739
76	1.32698	0.97042	0.24141	4.01985	4.14233	1.03048	0.24877
77	1.34444	0.97449	0.22443	4.3421	4.45573	1.02618	0.23031
78	1.3619	0.97826	0.20738	4.71723	4.82207	1.02222	0.21199
79	1.37937	0.98173	0.19026	5.15998	5.25597	1.01861	0.1938
80	1.39683	0.98491	0.17309	5.69013	5.77734	1.01532	0.17574
81	1.41429	0.98778	0.15587	6.33726	6.4156	1.01237	0.1578
82	1.43175	0.99035	0.1386	7.14544	7.21501	1.00974	0.13995
83	1.44921	0.99262	0.12129	8.18404	8.2447	1.00743	0.12219
84	1.46667	0.99458	0.10394	9.56899	9.62094	1.00545	0.10451
85	1.48413	0.99625	0.08656	11.5096	11.55268	1.00376	0.08689
86	1.50159	0.99761	0.06915	14.42647	14.46132	1.0024	0.06932
87	1.51905	0.99866	0.05172	19.30779	19.33488	1.00134	0.05179
88	1.53651	0.99941	0.03428	29.15472	29.17153	1.00059	0.0343
89	1.55397	0.99986	0.01683	59.42507	59.41771	1.00014	0.01683



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90	1.57143	1	-0.00063	-1578.10029	-1587.30159	1	-0.00063
91	1.58889	0.99984	-0.01809	-55.26191	-55.27916	1.00016	-0.01809
92	1.60635	0.99937	-0.03555	-28.11464	-28.1294	1.00063	-0.03557
93	1.62381	0.9986	-0.05299	-18.84538	-18.87149	1.0014	-0.05306
94	1.64127	0.99752	-0.07042	-14.1662	-14.20051	1.00249	-0.0706
95	1.65873	0.99614	-0.08782	-11.34288	-11.38693	1.00387	-0.08816
96	1.67619	0.99445	-0.1052	-9.45308	-9.5057	1.00558	-0.10579
97	1.69365	0.99246	-0.12254	-8.09877	-8.1606	1.0076	-0.12347
98	1.71111	0.99017	-0.13985	-7.08006	-7.15052	1.00993	-0.14124
99	1.72857	0.98758	-0.15712	-6.28551	-6.36456	1.01258	-0.1591
100	1.74603	0.98469	-0.17434	-5.64813	-5.73592	1.01555	-0.17705
101	1.76349	0.98149	-0.1915	-5.12519	-5.22193	1.01886	-0.19511
102	1.78095	0.978	-0.20861	-4.68816	-4.79363	1.02249	-0.2133
103	1.79841	0.97421	-0.22565	-4.31727	-4.43164	1.02647	-0.23162
104	1.81587	0.97012	-0.24263	-3.99839	-4.1215	1.0308	-0.2501
105	1.83333	0.96574	-0.25953	-3.72112	-3.85312	1.03548	-0.26874
106	1.85079	0.96106	-0.27635	-3.47769	-3.6186	1.04052	-0.28755
107	1.86825	0.95609	-0.29309	-3.26213	-3.41192	1.04593	-0.30655
108	1.88571	0.95082	-0.30973	-3.0698	-3.22862	1.05172	-0.32575
109	1.90317	0.94527	-0.32629	-2.89705	-3.06476	1.0579	-0.34518
110	1.92063	0.93943	-0.34274	-2.74093	-2.91766	1.06448	-0.36484
111	1.9381	0.9333	-0.3591	-2.59899	-2.78474	1.07147	-0.38476
112	1.95556	0.92689	-0.37534	-2.46946	-2.66425	1.07888	-0.40495



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113	1.97302	0.92019	-0.39147	-2.35064	-2.55447	1.08673	-0.42542
114	1.99048	0.91322	-0.40747	-2.24118	-2.45417	1.09503	-0.44619
115	2.00794	0.90596	-0.42335	-2.13997	-2.36211	1.1038	-0.46729
116	2.0254	0.89844	-0.43911	-2.04605	-2.27733	1.11304	-0.48875
117	2.04286	0.89063	-0.45473	-1.95862	-2.19911	1.1228	-0.51057
118	2.06032	0.88256	-0.47021	-1.87696	-2.12671	1.13307	-0.53278
119	2.07778	0.87421	-0.48554	-1.80049	-2.05956	1.14389	-0.5554
120	2.09524	0.8656	-0.50073	-1.72868	-1.99708	1.15527	-0.57848
121	2.1127	0.85673	-0.51577	-1.66107	-1.93885	1.16723	-0.60202
122	2.13016	0.84759	-0.53065	-1.59728	-1.88448	1.17982	-0.62607
123	2.14762	0.8382	-0.54536	-1.53695	-1.83365	1.19303	-0.65063
124	2.16508	0.82855	-0.55992	-1.47978	-1.78597	1.20693	-0.67578
125	2.18254	0.81865	-0.5743	-1.42548	-1.74125	1.22152	-0.70152
126	2.2	0.8085	-0.5885	-1.37382	-1.69924	1.23686	-0.72789
127	2.21746	0.7981	-0.60253	-1.32459	-1.65967	1.25298	-0.75496
128	2.23492	0.78746	-0.61637	-1.27757	-1.6224	1.26991	-0.78273
129	2.25238	0.77658	-0.63002	-1.23261	-1.58725	1.2877	-0.81128
130	2.26984	0.76546	-0.64349	-1.18955	-1.55403	1.3064	-0.84066
131	2.2873	0.75411	-0.65675	-1.14824	-1.52265	1.32607	-0.87089
132	2.30476	0.74253	-0.66982	-1.10855	-1.49294	1.34675	-0.90208
133	2.32222	0.73072	-0.68268	-1.07037	-1.46482	1.36851	-0.93426
134	2.33968	0.71869	-0.69533	-1.03359	-1.43817	1.39142	-0.9675
135	2.35714	0.70644	-0.70778	-0.99811	-1.41287	1.41555	-1.0019



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136	2.3746	0.69397	-0.72	-0.96385	-1.38889	1.44098	-1.03751
137	2.39206	0.6813	-0.73201	-0.93072	-1.3661	1.46778	-1.07443
138	2.40952	0.66841	-0.74379	-0.89866	-1.34447	1.49609	-1.11278
139	2.42698	0.65532	-0.75535	-0.86758	-1.32389	1.52597	-1.15264
140	2.44444	0.64204	-0.76667	-0.83743	-1.30434	1.55754	-1.19412
141	2.4619	0.62855	-0.77777	-0.80815	-1.28573	1.59096	-1.2374
142	2.47937	0.61487	-0.78863	-0.77967	-1.26802	1.62636	-1.2826
143	2.49683	0.60101	-0.79924	-0.75197	-1.25119	1.66387	-1.32983
144	2.51429	0.58696	-0.80961	-0.72499	-1.23516	1.70369	-1.37933
145	2.53175	0.57274	-0.81974	-0.69868	-1.2199	1.74599	-1.43126
146	2.54921	0.55834	-0.82961	-0.67301	-1.20539	1.79102	-1.48585
147	2.56667	0.54377	-0.83923	-0.64794	-1.19157	1.83901	-1.54335
148	2.58413	0.52903	-0.8486	-0.62342	-1.17841	1.89025	-1.60407
149	2.60159	0.51414	-0.85771	-0.59943	-1.1659	1.945	-1.66824
150	2.61905	0.49909	-0.86655	-0.57594	-1.154	2.00365	-1.73626
151	2.63651	0.48388	-0.87513	-0.55292	-1.14269	2.06663	-1.80857
152	2.65397	0.46853	-0.88345	-0.53034	-1.13193	2.13434	-1.88558
153	2.67143	0.45303	-0.89149	-0.50817	-1.12172	2.20736	-1.96784
154	2.68889	0.4374	-0.89927	-0.48639	-1.11201	2.28624	-2.05594
155	2.70635	0.42163	-0.90677	-0.46498	-1.10282	2.37175	-2.15063
156	2.72381	0.40573	-0.91399	-0.44392	-1.0941	2.46469	-2.25271
157	2.74127	0.38972	-0.92094	-0.42317	-1.08585	2.56594	-2.36308
158	2.75873	0.37358	-0.9276	-0.40274	-1.07805	2.6768	-2.483



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159	2.77619	0.35733	-0.93398	-0.38258	-1.07069	2.79853	-2.61377
160	2.79365	0.34096	-0.94008	-0.3627	-1.06374	2.9329	-2.75716
161	2.81111	0.3245	-0.94589	-0.34306	-1.05721	3.08166	-2.91492
162	2.82857	0.30794	-0.95141	-0.32366	-1.05107	3.24739	-3.0896
163	2.84603	0.29128	-0.95664	-0.30448	-1.04533	3.43312	-3.28426
164	2.86349	0.27453	-0.96158	-0.2855	-1.03996	3.64259	-3.50264
165	2.88095	0.2577	-0.96622	-0.26671	-1.03496	3.88048	-3.7494
166	2.89841	0.24079	-0.97058	-0.24809	-1.03031	4.153	-4.03082
167	2.91587	0.22381	-0.97463	-0.22964	-1.02603	4.46808	-4.35472
168	2.93333	0.20676	-0.97839	-0.21133	-1.02209	4.83653	-4.73201
169	2.95079	0.18965	-0.98185	-0.19315	-1.01849	5.27287	-5.17717
170	2.96825	0.17248	-0.98501	-0.1751	-1.01522	5.79777	-5.71087
171	2.98571	0.15525	-0.98787	-0.15716	-1.01228	6.44122	-6.36309
172	3.00317	0.13798	-0.99043	-0.13931	-1.00966	7.24743	-7.17807
173	3.02063	0.12067	-0.99269	-0.12156	-1.00736	8.28706	-8.22649
174	3.0381	0.10331	-0.99465	-0.10386	-1.00538	9.67961	-9.62782
175	3.05556	0.08593	-0.9963	-0.08625	-1.00371	11.63738	-11.59432
176	3.07302	0.06852	-0.99765	-0.06868	-1.00236	14.59428	-14.55998
177	3.09048	0.05109	-0.99869	-0.05116	-1.00131	19.5733	-19.54766
178	3.10794	0.03365	-0.99943	-0.03367	-1.00057	29.71768	-29.70074
179	3.1254	0.01619	-0.99987	-0.01619	-1.00013	61.76652	-61.75849
180	3.14286	-0.00127	-1	0.00127	-1	-787.40157	787.40157
181	3.16032	-0.01873	-0.99982	0.01873	-1.00018	-53.39028	53.38067



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182	3.17778	-0.03618	-0.99935	0.0362	-1.00065	-27.63958	27.62161
183	3.19524	-0.05362	-0.99856	0.0537	-1.00144	-18.64976	18.6229
184	3.2127	-0.07105	-0.99747	0.07123	-1.00254	-14.0746	14.03899
185	3.23016	-0.08845	-0.99608	0.0888	-1.00394	-11.30582	11.2615
186	3.24762	-0.10583	-0.99438	0.10643	-1.00565	-9.44912	9.39601
187	3.26508	-0.12317	-0.99239	0.12412	-1.00767	-8.11886	8.05708
188	3.28254	-0.14048	-0.99008	0.14189	-1.01002	-7.11845	7.04784
189	3.3	-0.15775	-0.98748	0.15975	-1.01268	-6.33914	6.25978
190	3.31746	-0.17496	-0.98458	0.1777	-1.01566	-5.71559	5.62746
191	3.33492	-0.19213	-0.98137	0.19577	-1.01898	-5.20481	5.10784
192	3.35238	-0.20923	-0.97787	0.21397	-1.02263	-4.77943	4.67366
193	3.36984	-0.22627	-0.97406	0.2323	-1.02663	-4.4195	4.30486
194	3.3873	-0.24324	-0.96997	0.25077	-1.03096	-4.11117	3.98771
195	3.40476	-0.26014	-0.96557	0.26942	-1.03566	-3.84408	3.71173
196	3.42222	-0.27696	-0.96088	0.28823	-1.04071	-3.61063	3.46938
197	3.43968	-0.29369	-0.9559	0.30724	-1.04613	-3.40495	3.25479
198	3.45714	-0.31034	-0.95063	0.32646	-1.05193	-3.22227	3.06319
199	3.4746	-0.32689	-0.94506	0.34589	-1.05813	-3.05913	2.89106
200	3.49206	-0.34334	-0.93921	0.36556	-1.06472	-2.91256	2.73551
201	3.50952	-0.35968	-0.93307	0.38548	-1.07173	-2.78025	2.59417
202	3.52698	-0.37592	-0.92665	0.40567	-1.07916	-2.66014	2.46502
203	3.54444	-0.39204	-0.91995	0.42615	-1.08702	-2.55076	2.34657
204	3.5619	-0.40804	-0.91296	0.44694	-1.09534	-2.45074	2.23743



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205	3.57937	-0.42393	-0.9057	0.46807	-1.10412	-2.35888	2.13644
206	3.59683	-0.43968	-0.89816	0.48953	-1.11339	-2.27438	2.04276
207	3.61429	-0.45529	-0.89034	0.51136	-1.12317	-2.1964	1.95554
208	3.63175	-0.47076	-0.88226	0.53359	-1.13345	-2.12422	1.87412
209	3.64921	-0.4861	-0.87391	0.55623	-1.14428	-2.05719	1.7978
210	3.66667	-0.50128	-0.86529	0.57932	-1.15568	-1.99489	1.72616
211	3.68413	-0.51631	-0.8564	0.60288	-1.16768	-1.93682	1.65869
212	3.70159	-0.53118	-0.84726	0.62695	-1.18028	-1.8826	1.59505
213	3.71905	-0.5459	-0.83785	0.65154	-1.19353	-1.83184	1.5348
214	3.73651	-0.56044	-0.82819	0.6767	-1.20745	-1.78431	1.47775
215	3.75397	-0.57481	-0.81828	0.70246	-1.22208	-1.73971	1.42357
216	3.77143	-0.58901	-0.80812	0.72887	-1.23744	-1.69776	1.372
217	3.78889	-0.60303	-0.79772	0.75595	-1.25357	-1.65829	1.32285
218	3.80635	-0.61687	-0.78707	0.78376	-1.27054	-1.62109	1.27591
219	3.82381	-0.63052	-0.77618	0.81234	-1.28836	-1.58599	1.23102
220	3.84127	-0.64397	-0.76505	0.84174	-1.3071	-1.55287	1.18802
221	3.85873	-0.65723	-0.75369	0.87202	-1.32681	-1.52154	1.14677
222	3.87619	-0.67029	-0.7421	0.90323	-1.34753	-1.49189	1.10713
223	3.89365	-0.68314	-0.73028	0.93545	-1.36934	-1.46383	1.069
224	3.91111	-0.69579	-0.71825	0.96873	-1.39227	-1.43722	1.03228
225	3.92857	-0.70822	-0.70599	1.00316	-1.41645	-1.41199	0.99685
226	3.94603	-0.72044	-0.69352	1.03882	-1.44192	-1.38804	0.96263
227	3.96349	-0.73244	-0.68083	1.0758	-1.4688	-1.3653	0.92954



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228	3.98095	-0.74421	-0.66794	1.11419	-1.49714	-1.34371	0.89752
229	3.99841	-0.75576	-0.65485	1.15411	-1.52707	-1.32317	0.86648
230	4.01587	-0.76708	-0.64155	1.19566	-1.55872	-1.30364	0.83635
231	4.03333	-0.77816	-0.62806	1.23899	-1.5922	-1.28508	0.80711
232	4.05079	-0.78901	-0.61438	1.28424	-1.62766	-1.26741	0.77867
233	4.06825	-0.79962	-0.60051	1.33156	-1.66525	-1.25059	0.75099
234	4.08571	-0.80998	-0.58646	1.38114	-1.70515	-1.2346	0.72404
235	4.10317	-0.8201	-0.57223	1.43316	-1.74755	-1.21936	0.69776
236	4.12063	-0.82996	-0.55782	1.48786	-1.79269	-1.20488	0.6721
237	4.1381	-0.83958	-0.54324	1.54551	-1.84081	-1.19107	0.64704
238	4.15556	-0.84894	-0.5285	1.60632	-1.89215	-1.17794	0.62254
239	4.17302	-0.85803	-0.51359	1.67064	-1.94708	-1.16546	0.59857
240	4.19048	-0.86687	-0.49854	1.73883	-2.00586	-1.15358	0.5751
241	4.20794	-0.87544	-0.48333	1.81129	-2.06898	-1.14228	0.5521
242	4.2254	-0.88375	-0.46797	1.88848	-2.13689	-1.13154	0.52953
243	4.24286	-0.89178	-0.45247	1.97093	-2.21009	-1.12135	0.50738
244	4.26032	-0.89955	-0.43683	2.05927	-2.28922	-1.11167	0.48561
245	4.27778	-0.90703	-0.42106	2.15419	-2.37496	-1.1025	0.46422
246	4.29524	-0.91425	-0.40516	2.25654	-2.46816	-1.09379	0.44316
247	4.3127	-0.92118	-0.38913	2.36727	-2.56984	-1.08556	0.42243
248	4.33016	-0.92784	-0.37299	2.48756	-2.68104	-1.07777	0.402
249	4.34762	-0.93421	-0.35673	2.61878	-2.80324	-1.07042	0.38185
250	4.36508	-0.94029	-0.34037	2.76257	-2.93798	-1.0635	0.36198



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251	4.38254	-0.94609	-0.3239	2.92093	-3.08737	-1.05698	0.34236
252	4.4	-0.9516	-0.30733	3.09632	-3.25383	-1.05086	0.32296
253	4.41746	-0.95682	-0.29067	3.29176	-3.44033	-1.04513	0.30379
254	4.43492	-0.96175	-0.27392	3.51104	-3.6507	-1.03977	0.28481
255	4.45238	-0.96639	-0.25709	3.75896	-3.88969	-1.03478	0.26603
256	4.46984	-0.97073	-0.24018	4.04171	-4.16354	-1.03015	0.24742
257	4.4873	-0.97477	-0.22319	4.3674	-4.48049	-1.02588	0.22897
258	4.50476	-0.97852	-0.20614	4.74687	-4.85107	-1.02195	0.21067
259	4.52222	-0.98197	-0.18902	5.19494	-5.29045	-1.01836	0.19249
260	4.53968	-0.98512	-0.17185	5.7324	-5.81903	-1.0151	0.17445
261	4.55714	-0.98797	-0.15463	6.38943	-6.46705	-1.01218	0.15651
262	4.5746	-0.99052	-0.13735	7.21149	-7.28067	-1.00957	0.13866
263	4.59206	-0.99277	-0.12004	8.2704	-8.33056	-1.00728	0.12091
264	4.60952	-0.99471	-0.10269	9.68679	-9.73805	-1.00532	0.10324
265	4.62698	-0.99635	-0.08531	11.67989	-11.72196	-1.00366	0.08562
266	4.64444	-0.99769	-0.0679	14.69427	-14.72754	-1.00232	0.06806
267	4.6619	-0.99873	-0.05047	19.78947	-19.81375	-1.00127	0.05053
268	4.67937	-0.99945	-0.03301	30.2746	-30.29385	-1.00055	0.03303
269	4.69683	-0.99988	-0.01556	64.26638	-64.26735	-1.00012	0.01556
270	4.71429	-1	0.0019	-526.03287	526.31579	-1	-0.0019
271	4.73175	-0.99981	0.01936	-51.64372	51.65289	-1.00019	-0.01936
272	4.74921	-0.99932	0.03681	-27.14613	27.16653	-1.00068	-0.03684
273	4.76667	-0.99853	0.05425	-18.40455	18.43318	-1.00147	-0.05433



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274	4.78413	-0.99743	0.07168	-13.9151	13.95089	-1.00258	-0.07186
275	4.80159	-0.99602	0.08908	-11.18088	11.22586	-1.004	-0.08944
276	4.81905	-0.99432	0.10646	-9.33992	9.3932	-1.00571	-0.10707
277	4.83651	-0.99231	0.1238	-8.01524	8.07754	-1.00775	-0.12476
278	4.85397	-0.98999	0.14111	-7.01584	7.08667	-1.01011	-0.14254
279	4.87143	-0.98738	0.15837	-6.23458	6.31433	-1.01278	-0.16039
280	4.88889	-0.98446	0.17559	-5.60673	5.69509	-1.01579	-0.17836
281	4.90635	-0.98125	0.19275	-5.09086	5.18807	-1.01911	-0.19643
282	4.92381	-0.97773	0.20985	-4.65921	4.76531	-1.02278	-0.21463
283	4.94127	-0.97392	0.22689	-4.29252	4.40742	-1.02678	-0.23297
284	4.95873	-0.96981	0.24386	-3.97697	4.10071	-1.03113	-0.25145
285	4.97619	-0.96541	0.26075	-3.70239	3.83509	-1.03583	-0.27009
286	4.99365	-0.96071	0.27757	-3.46116	3.60269	-1.0409	-0.28892
287	5.01111	-0.95571	0.2943	-3.24743	3.39789	-1.04634	-0.30794
288	5.02857	-0.95043	0.31094	-3.05664	3.21605	-1.05216	-0.32716
289	5.04603	-0.94486	0.32749	-2.88519	3.05353	-1.05836	-0.3466
290	5.06349	-0.93899	0.34393	-2.73018	2.90757	-1.06497	-0.36628
291	5.08095	-0.93285	0.36027	-2.58927	2.7757	-1.07198	-0.3862
292	5.09841	-0.92641	0.37651	-2.46056	2.65597	-1.07944	-0.40642
293	5.11587	-0.9197	0.39262	-2.34245	2.54699	-1.08731	-0.4269
294	5.13333	-0.9127	0.40862	-2.23363	2.44726	-1.09565	-0.4477
295	5.15079	-0.90543	0.42449	-2.13298	2.35577	-1.10445	-0.46883
296	5.16825	-0.89788	0.44024	-2.03955	2.27149	-1.11373	-0.49031



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297	5.18571	-0.89006	0.45584	-1.95255	2.19375	-1.12352	-0.51215
298	5.20317	-0.88197	0.47131	-1.87129	2.12175	-1.13383	-0.53438
299	5.22063	-0.8736	0.48664	-1.79517	2.05491	-1.14469	-0.55705
300	5.2381	-0.86497	0.50183	-1.72363	1.99271	-1.15611	-0.58017
301	5.25556	-0.85607	0.51685	-1.65632	1.9348	-1.16813	-0.60375
302	5.27302	-0.84692	0.53172	-1.59279	1.88069	-1.18075	-0.62783
303	5.29048	-0.83751	0.54643	-1.5327	1.83006	-1.19402	-0.65245
304	5.30794	-0.82784	0.56096	-1.47574	1.78266	-1.20796	-0.67762
305	5.3254	-0.81792	0.57533	-1.42165	1.73813	-1.22261	-0.70341
306	5.34286	-0.80775	0.58953	-1.37017	1.69627	-1.23801	-0.72984
307	5.36032	-0.79733	0.60354	-1.3211	1.65689	-1.25419	-0.75695
308	5.37778	-0.78668	0.61737	-1.27424	1.61977	-1.27116	-0.78478
309	5.39524	-0.77578	0.63101	-1.22943	1.58476	-1.28903	-0.81339
310	5.4127	-0.76464	0.64446	-1.18649	1.55169	-1.3078	-0.84283
311	5.43016	-0.75327	0.65771	-1.1453	1.52043	-1.32755	-0.87314
312	5.44762	-0.74168	0.67076	-1.10573	1.49085	-1.34829	-0.90438
313	5.46508	-0.72985	0.68361	-1.06765	1.46282	-1.37014	-0.93664
314	5.48254	-0.71781	0.69624	-1.03097	1.43629	-1.39313	-0.96995
315	5.5	-0.70554	0.70867	-0.99558	1.41109	-1.41735	-1.00444
316	5.51746	-0.69306	0.72088	-0.96141	1.38719	-1.44288	-1.04014
317	5.53492	-0.68037	0.73287	-0.92836	1.3645	-1.46979	-1.07716
318	5.55238	-0.66747	0.74464	-0.89637	1.34293	-1.49819	-1.11562
319	5.56984	-0.65437	0.75618	-0.86536	1.32244	-1.52819	-1.15558



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320	5.5873	-0.64107	0.76749	-0.83528	1.30295	-1.55989	-1.1972
321	5.60476	-0.62757	0.77856	-0.80606	1.28442	-1.59345	-1.24059
322	5.62222	-0.61388	0.7894	-0.77765	1.26678	-1.62898	-1.28592
323	5.63968	-0.6	0.8	-0.75001	1.25	-1.66667	-1.33333
324	5.65714	-0.58594	0.81035	-0.72308	1.23403	-1.70666	-1.38299
325	5.6746	-0.57171	0.82046	-0.69682	1.21883	-1.74914	-1.4351
326	5.69206	-0.5573	0.83031	-0.67119	1.20437	-1.79437	-1.48988
327	5.70952	-0.54271	0.83992	-0.64615	1.19059	-1.8426	-1.54764
328	5.72698	-0.52797	0.84926	-0.62168	1.1775	-1.89405	-1.60854
329	5.74444	-0.51306	0.85835	-0.59773	1.16503	-1.94909	-1.673
330	5.7619	-0.498	0.86718	-0.57427	1.15316	-2.00803	-1.74133
331	5.77937	-0.48277	0.87575	-0.55127	1.14188	-2.07138	-1.81401
332	5.79683	-0.46741	0.88404	-0.52872	1.13117	-2.13945	-1.89136
333	5.81429	-0.4519	0.89207	-0.50658	1.12099	-2.21288	-1.97404
334	5.83175	-0.43626	0.89982	-0.48483	1.11133	-2.29221	-2.06258
335	5.84921	-0.42048	0.9073	-0.46344	1.10217	-2.37823	-2.15777
336	5.86667	-0.40458	0.9145	-0.4424	1.09349	-2.4717	-2.26037
337	5.88413	-0.38855	0.92143	-0.42168	1.08527	-2.57367	-2.37146
338	5.90159	-0.3724	0.92807	-0.40126	1.0775	-2.68528	-2.49213
339	5.91905	-0.35614	0.93443	-0.38113	1.07017	-2.80788	-2.62377
340	5.93651	-0.33977	0.94051	-0.36127	1.06325	-2.94317	-2.76808
341	5.95397	-0.3233	0.9463	-0.34165	1.05675	-3.0931	-2.927
342	5.97143	-0.30673	0.9518	-0.32226	1.05064	-3.2602	-3.10305



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343	5.98889	-0.29007	0.95701	-0.3031	1.04492	-3.44744	-3.29924
344	6.00635	-0.27331	0.96193	-0.28413	1.03958	-3.65885	-3.51956
345	6.02381	-0.25648	0.96655	-0.26535	1.03461	-3.89894	-3.76852
346	6.04127	-0.23956	0.97088	-0.24675	1.02999	-4.17432	-4.05276
347	6.05873	-0.22258	0.97492	-0.2283	1.02573	-4.49277	-4.38009
348	6.07619	-0.20552	0.97865	-0.21	1.02182	-4.86571	-4.76182
349	6.09365	-0.1884	0.98209	-0.19184	1.01824	-5.30786	-5.21279
350	6.11111	-0.17123	0.98523	-0.17379	1.01499	-5.8401	-5.75384
351	6.12857	-0.154	0.98807	-0.15586	1.01207	-6.49351	-6.41604
352	6.14603	-0.13673	0.99061	-0.13802	1.00948	-7.31368	-7.24501
353	6.16349	-0.11941	0.99285	-0.12027	1.0072	-8.37451	-8.31463
354	6.18095	-0.10206	0.99478	-0.10259	1.00525	-9.79816	-9.74701
355	6.19841	-0.08467	0.99641	-0.08498	1.0036	-11.81056	-11.76816
356	6.21587	-0.06726	0.99774	-0.06742	1.00227	-14.86768	-14.83408
357	6.23333	-0.04983	0.99876	-0.0499	1.00124	-20.06823	-20.04335
358	6.25079	-0.03239	0.99948	-0.03241	1.00052	-30.87373	-30.85767
359	6.26825	-0.01493	0.99989	-0.01494	1.00011	-66.97924	-66.97187
360	6.28571	0.00252	1	0.00252	1	396.8254	396.8254