NATURAL HAVERSINES

' \ °	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	° / "
0	.00000	.00008	.00030	.00069	.00122	.00190	.00274	.00373	.00487	.00616	.00760	.00919	.01093	.01281	.01485	.01704	.01937	.02185	.02447	.02724	**60**
1	.00000	.00008	.00031	.00069	.00123	.00192	.00275	.00374	.00489	.00618	.00762	.00921	.01096	.01285	.01489	.01707	.01941	.02189	.02452	.02729	**59**
2	.00000	.00008	.00031	.00070	.00124	.00193	.00277	.00376	.00491	.00620	.00765	.00924	.01099	.01288	.01492	.01711	.01945	.02193	.02456	.02734	**58**
3	.00000	.00008	.00032	.00071	.00125	.00194	.00278	.00378	.00493	.00622	.00767	.00927	.01102	.01291	.01496	.01715	.01949	.02198	.02461	.02738	**57**
4	.00000	.00009	.00033	.00072	.00126	.00195	.00280	.00380	.00495	.00625	.00770	.00930	.01105	.01295	.01499	.01719	.01953	.02202	.02465	.02743	**56**
5	.00000	.00009	.00033	.00072	.00127	.00197	.00282	.00382	.00497	.00627	.00772	.00933	.01108	.01298	.01503	.01723	.01957	.02206	.02470	.02748	**55**
6	.00000	.00009	.00034	.00073	.00128	.00198	.00283	.00383	.00499	.00629	.00775	.00935	.01111	.01301	.01506	.01726	.01961	.02210	.02474	.02753	**54**
7	.00000	.00009	.00034	.00074	.00129	.00199	.00285	.00385	.00501	.00632	.00777	.00938	.01114	.01305	.01510	.01730	.01965	.02215	.02479	.02757	**53**
8	.00000	.00010	.00035	.00075	.00130	.00201	.00286	.00387	.00503	.00634	.00780	.00941	.01117	.01308	.01513	.01734	.01969	.02219	.02483	.02762	**52**
9	.00000	.00010	.00035	.00076	.00131	.00202	.00288	.00389	.00505	.00636	.00783	.00944	.01120	.01311	.01517	.01738	.01973	.02223	.02488	.02767	**51**
10	.00000	.00010	.00036	.00076	.00132	.00203	.00289	.00391	.00507	.00639	.00785	.00947	.01123	.01314	.01521	.01742	.01977	.02227	.02492	.02772	**50**
11	.00000	.00011	.00036	.00077	.00133	.00204	.00291	.00392	.00509	.00641	.00788	.00949	.01126	.01318	.01524	.01745	.01981	.02232	.02497	.02776	**49**
12	.00000	.00011	.00037	.00078	.00134	.00206	.00292	.00394	.00511	.00643	.00790	.00952	.01129	.01321	.01528	.01749	.01985	.02236	.02501	.02781	**48**
13	.00000	.00011	.00037	.00079	.00135	.00207	.00294	.00396	.00513	.00646	.00793	.00955	.01132	.01324	.01531	.01753	.01989	.02240	.02506	.02786	**47**
14	.00000	.00012	.00038	.00080	.00136	.00208	.00296	.00398	.00515	.00648	.00795	.00958	.01135	.01328	.01535	.01757	.01993	.02245	.02510	.02791	**46**
15	.00000	.00012	.00039	.00080	.00137	.00210	.00297	.00400	.00517	.00650	.00798	.00961	.01138	.01331	.01538	.01761	.01998	.02249	.02515	.02796	**45**
16	.00001	.00012	.00039	.00081	.00139	.00211	.00299	.00402	.00520	.00653	.00801	.00964	.01142	.01334	.01542	.01764	.02002	.02253	.02520	.02800	**44**
17	.00001	.00013	.00040	.00082	.00140	.00212	.00300	.00403	.00522	.00655	.00803	.00966	.01145	.01338	.01546	.01768	.02006	.02258	.02524	.02805	**43**
18	.00001	.00013	.00040	.00083	.00141	.00214	.00302	.00405	.00524	.00657	.00806	.00969	.01148	.01341	.01549	.01772	.02010	.02262	.02529	.02810	**42**
19	.00001	.00013	.00041	.00084	.00142	.00215	.00304	.00407	.00526	.00660	.00808	.00972	.01151	.01344	.01553	.01776	.02014	.02266	.02533	.02815	**41**
20	.00001	.00014	.00041	.00085	.00143	.00216	.00305	.00409	.00528	.00662	.00811	.00975	.01154	.01348	.01556	.01780	.02018	.02271	.02538	.02820	**40**
21	.00001	.00014	.00042	.00085	.00144	.00218	.00307	.00411	.00530	.00664	.00814	.00978	.01157	.01351	.01560	.01784	.02022	.02275	.02542	.02824	**39**
22	.00001	.00014	.00043	.00086	.00145	.00219	.00308	.00413	.00532	.00667	.00816	.00981	.01160	.01354	.01564	.01788	.02026	.02279	.02547	.02829	**38**
23	.00001	.00015	.00043	.00087	.00146	.00221	.00310	.00415	.00534	.00669	.00819	.00984	.01163	.01358	.01567	.01791	.02030	.02284	.02552	.02834	**37**
24	.00001	.00015	.00044	.00088	.00147	.00222	.00312	.00416	.00536	.00671	.00821	.00986	.01166	.01361	.01571	.01795	.02034	.02288	.02556	.02839	**36**
25	.00001	.00015	.00044	.00089	.00148	.00223	.00313	.00418	.00539	.00674	.00824	.00989	.01170	.01365	.01574	.01799	.02038	.02292	.02561	.02844	**35**
26	.00001	.00016	.00045	.00090	.00150	.00225	.00315	.00420	.00541	.00676	.00827	.00992	.01173	.01368	.01578	.01803	.02043	.02297	.02565	.02849	**34**
27	.00002	.00016	.00046	.00091	.00151	.00226	.00316	.00422	.00543	.00679	.00829	.00995	.01176	.01371	.01582	.01807	.02047	.02301	.02570	.02853	**33**
28	.00002	.00016	.00046	.00091	.00152	.00227	.00318	.00424	.00545	.00681	.00832	.00998	.01179	.01375	.01585	.01811	.02051	.02305	.02575	.02858	**32**
29	.00002	.00017	.00047	.00092	.00153	.00229	.00320	.00426	.00547	.00683	.00835	.01001	.01182	.01378	.01589	.01815	.02055	.02310	.02579	.02863	**31**
30	.00002	.00017	.00048	.00093	.00154	.00230	.00321	.00428	.00549	.00686	.00837	.01004	.01185	.01382	.01593	.01818	.02059	.02314	.02584	.02868	**30**
31	.00002	.00018	.00048	.00094	.00155	.00232	.00323	.00430	.00551	.00688	.00840	.01007	.01188	.01385	.01596	.01822	.02063	.02319	.02588	.02873	**29**
32	.00002	.00018	.00049	.00095	.00156	.00233	.00325	.00432	.00554	.00691	.00843	.01010	.01192	.01388	.01600	.01826	.02067	.02323	.02593	.02878	**28**
33	.00002	.00018	.00050	.00096	.00158	.00234	.00326	.00433	.00556	.00693	.00845	.01012	.01195	.01392	.01604	.01830	.02071	.02327	.02598	.02883	**27**
34	.00002	.00019	.00050	.00097	.00159	.00236	.00328	.00435	.00558	.00695	.00848	.01015	.01198	.01395	.01607	.01834	.02076	.02332	.02602	.02887	**26**
35	.00003	.00019	.00051	.00098	.00160	.00237	.00330	.00437	.00560	.00698	.00851	.01018	.01201	.01399	.01611	.01838	.02080	.02336	.02607	.02892	**25**
36	.00003	.00019	.00051	.00099	.00161	.00239	.00331	.00439	.00562	.00700	.00853	.01021	.01204	.01402	.01615	.01842	.02084	.02340	.02612	.02897	**24**
37	.00003	.00020	.00052	.00100	.00162	.00240	.00333	.00441	.00564	.00703	.00856	.01024	.01207	.01405	.01618	.01846	.02088	.02345	.02616	.02902	**23**
38	.00003	.00020	.00053	.00100	.00163	.00241	.00335	.00443	.00567	.00705	.00859	.01027	.01211	.01409	.01622	.01850	.02092	.02349	.02621	.02907	**22**
39	.00003	.00021	.00053	.00101	.00165	.00243	.00336	.00445	.00569	.00707	.00861	.01030	.01214	.01412	.01626	.01854	.02096	.02354	.02626	.02912	**21**
40	.00003	.00021	.00054	.00102	.00166	.00244	.00338	.00447	.00571	.00710	.00864	.01033	.01217	.01416	.01629	.01858	.02101	.02358	.02630	.02917	**20**
41	.00004	.00022	.00055	.00103	.00167	.00246	.00340	.00449	.00573	.00712	.00867	.01036	.01220	.01419	.01633	.01861	.02105	.02363	.02635	.02922	**19**
42	.00004	.00022	.00056	.00104	.00168	.00247	.00341	.00451	.00575	.00715	.00869	.01039	.01223	.01423	.01637	.01865	.02109	.02367	.02639	.02926	**18**
43	.00004	.00022	.00056	.00105	.00169	.00249	.00343	.00453	.00578	.00717	.00872	.01042	.01226	.01426	.01640	.01869	.02113	.02371	.02644	.02931	**17**
44	.00004	.00023	.00057	.00106	.00171	.00250	.00345	.00455	.00580	.00720	.00875	.01045	.01230	.01429	.01644	.01873	.02117	.02376	.02649	.02936	**16**
45	.00004	.00023	.00058	.00107	.00172	.00252	.00347	.00457	.00582	.00722	.00877	.01048	.01233	.01433	.01648	.01877	.02121	.02380	.02653	.02941	**15**
46	.00004	.00024	.00058	.00108	.00173	.00253	.00348	.00459	.00584	.00725	.00880	.01051	.01236	.01436	.01651	.01881	.02126	.02385	.02658	.02946	**14**
47	.00005	.00024	.00059	.00109	.00174	.00254	.00350	.00461	.00586	.00727	.00883	.01054	.01239	.01440	.01655	.01885	.02130	.02389	.02663	.02951	**13**
48	.00005	.00025	.00060	.00110	.00175	.00256	.00352	.00463	.00589	.00730	.00886	.01057	.01243	.01443	.01659	.01889	.02134	.02394	.02668	.02956	**12**
49	.00005	.00025	.00060	.00111	.00177	.00257	.00353	.00465	.00591	.00732	.00888	.01060	.01246	.01447	.01663	.01893	.02138	.02398	.02672	.02961	**11**
50	.00005	.00026	.00061	.00112	.00178	.00259	.00355	.00467	.00593	.00735	.00891	.01063	.01249	.01450	.01666	.01897	.02142	.02402	.02677	.02966	**10**
51	.00006	.00026	.00062	.00113	.00179	.00260	.00357	.00469	.00595	.00737	.00894	.01066	.01252	.01454	.01670	.01901	.02147	.02407	.02682	.02971	**9**
52	.00006	.00027	.00063	.00114	.00180	.00262	.00359	.00471	.00598	.00740	.00897	.01069	.01255	.01457	.01674	.01905	.02151	.02411	.02686	.02976	**8**
53	.00006	.00027	.00063	.00115	.00181	.00263	.00360	.00473	.00600	.00742	.00899	.01072	.01259	.01461	.01677	.01909	.02155	.02416	.02691	.02981	**7**
54	.00006	.00027	.00064	.00116	.00183	.00265	.00362	.00475	.00602	.00745	.00902	.01075	.01262	.01464	.01681	.01913	.02159	.02420	.02696	.02986	**6**
55	.00006	.00028	.00065	.00117	.00184	.00266	.00364	.00477	.00604	.00747	.00905	.01078	.01265	.01468	.01685	.01917	.02164	.02425	.02700	.02991	**5**
56	.00007	.00028	.00066	.00118	.00185	.00268	.00366	.00479	.00607	.00750	.00908	.01081	.01268	.01471	.01689	.01921	.02168	.02429	.02705	.02996	**4**
57	.00007	.00029	.00066	.00119	.00186	.00269	.00367	.00481	.00609	.00752	.00910	.01084	.01272	.01475	.01692	.01925	.02172	.02434	.02710	.03000	**3**
58	.00007	.00029	.00067	.00120	.00188	.00271	.00369	.00483	.00611	.00755	.00913	.01087	.01275	.01478	.01696	.01929	.02176	.02438	.02715	.03005	**2**
59	.00007	.00030	.00068	.00121	.00189	.00272	.00371	.00485	.00613	.00757	.00916	.01090	.01278	.01482	.01700	.01933	.02181	.02443	.02719	.03010	**1**
60	.00008	.00030	.00069	.00122	.00190	.00274	.00373	.00487	.00616	.00760	.00919	.01093	.01281	.01485	.01704	.01937	.02185	.02447	.02724	.03015	**0**
' \ °	**359**	**358**	**357**	**356**	**355**	**354**	**353**	**352**	**351**	**350**	**349**	**348**	**347**	**346**	**345**	**344**	**343**	**342**	**341**	**340**	**° / "**

NATURAL HAVERSINES

' \ °	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	° / "
0	.03015	.03321	.03641	.03975	.04323	.04685	.05060	.05450	.05853	.06269	.06699	.07142	.07598	.08066	.08548	.09042	.09549	.10068	.10599	.11143	**60**
1	.03020	.03326	.03646	.03980	.04329	.04691	.05067	.05456	.05859	.06276	.06706	.07149	.07605	.08074	.08556	.09051	.09558	.10077	.10608	.11152	**59**
2	.03025	.03321	.03652	.03986	.04335	.04697	.05073	.05463	.05866	.06283	.06713	.07157	.07613	.08082	.08564	.09059	.09566	.10086	.10617	.11161	**58**
3	.03030	.03337	.03657	.03992	.04340	.04703	.05079	.05469	.05873	.06290	.06721	.07164	.07621	.08090	.08573	.09067	.09575	.10094	.10626	.11170	**57**
4	.03035	.03342	.03663	.03998	.04346	.04709	.05086	.05476	.05880	.06297	.06728	.07172	.07628	.08098	.08581	.09076	.09583	.10103	.10635	.11179	**56**
5	.03040	.03347	.03668	.04003	.04352	.04715	.05092	.05483	.05887	.06304	.06735	.07179	.07636	.08106	.08589	.09084	.09592	.10112	.10644	.11189	**55**
6	.03045	.03352	.03674	.04009	.04358	.04722	.05099	.05489	.05894	.06311	.06742	.07187	.07644	.08114	.08597	.09093	.09601	.10121	.10653	.11198	**54**
7	.03050	.03358	.03679	.04015	.04364	.04728	.05105	.05496	.05901	.06318	.06750	.07194	.07652	.08122	.08605	.09101	.09609	.10130	.10662	.11207	**53**
8	.03055	.03363	.03685	.04020	.04370	.04734	.05111	.05503	.05907	.06326	.06757	.07202	.07659	.08130	.08613	.09109	.09618	.10138	.10671	.11216	**52**
9	.03060	.03368	.03690	.04026	.04376	.04740	.05118	.05509	.05914	.06333	.06764	.07209	.07667	.08138	.08621	.09118	.09626	.10147	.10680	.11225	**51**
10	.03065	.03373	.03695	.04032	.04382	.04746	.05124	.05516	.05921	.06340	.06772	.07217	.07675	.08146	.08630	.09126	.09635	.10156	.10689	.11234	**50**
11	.03070	.03379	.03701	.04038	.04388	.04752	.05131	.05523	.05928	.06347	.06779	.07224	.07683	.08154	.08638	.09134	.09643	.10165	.10698	.11244	**49**
12	.03075	.03384	.03706	.04043	.04394	.04759	.05137	.05529	.05935	.06354	.06786	.07232	.07690	.08162	.08646	.09143	.09652	.10174	.10707	.11253	**48**
13	.03080	.03389	.03712	.04049	.04400	.04765	.05144	.05536	.05942	.06361	.06794	.07239	.07698	.08170	.08654	.09151	.09661	.10182	.10716	.11262	**47**
14	.03085	.03394	.03717	.04055	.04406	.04771	.05150	.05542	.05949	.06368	.06801	.07247	.07706	.08178	.08662	.09160	.09669	.10191	.10725	.11271	**46**
15	.03090	.03400	.03723	.04060	.04412	.04777	.05156	.05549	.05955	.06375	.06808	.07254	.07714	.08186	.08671	.09168	.09678	.10200	.10734	.11280	**45**
16	.03095	.03405	.03728	.04066	.04418	.04783	.05163	.05556	.05962	.06382	.06816	.07262	.07721	.08194	.08679	.09176	.09686	.10209	.10743	.11290	**44**
17	.03101	.03410	.03734	.04072	.04424	.04790	.05169	.05562	.05969	.06389	.06823	.07270	.07729	.08202	.08687	.09185	.09695	.10218	.10752	.11299	**43**
18	.03106	.03415	.03740	.04078	.04430	.04796	.05176	.05569	.05976	.06397	.06830	.07277	.07737	.08210	.08695	.09193	.09704	.10226	.10761	.11308	**42**
19	.03111	.03421	.03745	.04083	.04436	.04802	.05182	.05576	.05983	.06404	.06838	.07285	.07745	.08218	.08703	.09202	.09712	.10235	.10770	.11317	**41**
20	.03116	.03426	.03751	.04089	.04442	.04808	.05189	.05582	.05990	.06411	.06845	.07292	.07752	.08226	.08711	.09210	.09721	.10244	.10779	.11326	**40**
21	.03121	.03431	.03756	.04095	.04448	.04815	.05195	.05589	.05997	.06418	.06852	.07300	.07760	.08234	.08720	.09218	.09729	.10253	.10788	.11336	**39**
22	.03126	.03437	.03762	.04101	.04454	.04821	.05201	.05596	.06004	.06425	.06860	.07307	.07768	.08242	.08728	.09227	.09738	.10262	.10797	.11345	**38**
23	.03131	.03442	.03767	.04106	.04460	.04827	.05208	.05603	.06011	.06432	.06867	.07315	.07776	.08250	.08736	.09235	.09747	.10270	.10806	.11354	**37**
24	.03136	.03447	.03773	.04112	.04466	.04833	.05214	.05609	.06018	.06439	.06874	.07322	.07784	.08258	.08744	.09244	.09755	.10279	.10815	.11363	**36**
25	.03141	.03453	.03778	.04118	.04472	.04839	.05221	.05616	.06024	.06446	.06882	.07330	.07791	.08266	.08753	.09252	.09764	.10288	.10824	.11373	**35**
26	.03146	.03458	.03784	.04124	.04478	.04846	.05227	.05623	.06031	.06454	.06889	.07338	.07799	.08274	.08761	.09260	.09773	.10297	.10833	.11382	**34**
27	.03151	.03463	.03789	.04130	.04484	.04852	.05234	.05629	.06038	.06461	.06896	.07345	.07807	.08282	.08769	.09269	.09781	.10306	.10842	.11391	**33**
28	.03156	.03468	.03795	.04135	.04490	.04858	.05240	.05636	.06045	.06468	.06904	.07353	.07815	.08290	.08777	.09277	.09790	.10315	.10851	.11400	**32**
29	.03161	.03474	.03800	.04141	.04496	.04864	.05247	.05643	.06052	.06475	.06911	.07360	.07823	.08298	.08785	.09286	.09799	.10323	.10861	.11410	**31**
30	.03166	.03479	.03806	.04147	.04502	.04871	.05253	.05649	.06059	.06482	.06919	.07368	.07830	.08306	.08794	.09294	.09807	.10332	.10870	.11419	**30**
31	.03171	.03484	.03812	.04153	.04508	.04877	.05260	.05656	.06066	.06489	.06926	.07376	.07838	.08314	.08802	.09303	.09816	.10341	.10879	.11428	**29**
32	.03177	.03490	.03817	.04159	.04514	.04883	.05266	.05663	.06073	.06497	.06933	.07383	.07846	.08322	.08810	.09311	.09824	.10350	.10888	.11437	**28**
33	.03182	.03495	.03823	.04164	.04520	.04890	.05273	.05670	.06080	.06504	.06941	.07391	.07854	.08330	.08818	.09320	.09833	.10359	.10897	.11447	**27**
34	.03187	.03500	.03828	.04170	.04526	.04896	.05279	.05676	.06087	.06511	.06948	.07398	.07862	.08338	.08827	.09328	.09842	.10368	.10906	.11456	**26**
35	.03192	.03506	.03834	.04176	.04532	.04902	.05286	.05683	.06094	.06518	.06955	.07406	.07870	.08346	.08835	.09336	.09850	.10377	.10915	.11465	**25**
36	.03197	.03511	.03839	.04182	.04538	.04908	.05292	.05690	.06101	.06525	.06963	.07414	.07877	.08354	.08843	.09345	.09859	.10386	.10924	.11474	**24**
37	.03202	.03517	.03845	.04188	.04544	.04915	.05299	.05697	.06108	.06532	.06970	.07421	.07885	.08362	.08851	.09353	.09868	.10394	.10933	.11484	**23**
38	.03207	.03522	.03851	.04194	.04550	.04921	.05305	.05703	.06115	.06540	.06978	.07429	.07893	.08370	.08860	.09362	.09876	.10403	.10942	.11493	**22**
39	.03212	.03527	.03856	.04199	.04556	.04927	.05312	.05710	.06122	.06547	.06985	.07437	.07901	.08378	.08868	.09370	.09885	.10412	.10951	.11502	**21**
40	.03218	.03533	.03862	.04205	.04562	.04934	.05318	.05717	.06129	.06554	.06993	.07444	.07909	.08386	.08876	.09379	.09894	.10421	.10960	.11511	**20**
41	.03223	.03538	.03867	.04211	.04569	.04940	.05325	.05724	.06136	.06561	.07000	.07452	.07917	.08394	.08885	.09387	.09903	.10430	.10969	.11521	**19**
42	.03228	.03543	.03873	.04217	.04575	.04946	.05331	.05730	.06143	.06568	.07007	.07459	.07924	.08402	.08893	.09396	.09911	.10439	.10978	.11530	**18**
43	.03233	.03549	.03879	.04223	.04581	.04952	.05338	.05737	.06150	.06576	.07015	.07467	.07932	.08410	.08901	.09404	.09920	.10448	.10988	.11539	**17**
44	.03238	.03554	.03884	.04229	.04587	.04959	.05345	.05744	.06157	.06583	.07022	.07475	.07940	.08418	.08909	.09413	.09929	.10457	.10997	.11549	**16**
45	.03243	.03560	.03890	.04234	.04593	.04965	.05351	.05751	.06164	.06590	.07030	.07482	.07948	.08427	.08918	.09421	.09937	.10466	.11006	.11558	**15**
46	.03248	.03565	.03896	.04240	.04599	.04971	.05358	.05757	.06171	.06597	.07037	.07490	.07956	.08435	.08926	.09430	.09946	.10474	.11015	.11567	**14**
47	.03254	.03570	.03901	.04246	.04605	.04978	.05364	.05764	.06178	.06605	.07045	.07498	.07964	.08443	.08934	.09438	.09955	.10483	.11024	.11577	**13**
48	.03259	.03576	.03907	.04252	.04611	.04984	.05371	.05771	.06185	.06612	.07052	.07505	.07972	.08451	.08943	.09447	.09963	.10492	.11033	.11586	**12**
49	.03264	.03581	.03912	.04258	.04617	.04990	.05377	.05778	.06192	.06619	.07059	.07513	.07980	.08459	.08951	.09455	.09972	.10501	.11042	.11595	**11**
50	.03269	.03587	.03918	.04264	.04623	.04997	.05384	.05785	.06199	.06626	.07067	.07521	.07987	.08467	.08959	.09464	.09981	.10510	.11051	.11604	**10**
51	.03274	.03592	.03924	.04270	.04629	.05003	.05390	.05791	.06206	.06633	.07074	.07528	.07995	.08475	.08967	.09472	.09990	.10519	.11060	.11614	**9**
52	.03279	.03597	.03929	.04276	.04636	.05009	.05397	.05798	.06213	.06641	.07082	.07536	.08003	.08483	.08976	.09481	.09998	.10528	.11070	.11623	**8**
53	.03285	.03603	.03935	.04281	.04642	.05016	.05404	.05805	.06220	.06648	.07089	.07544	.08011	.08491	.08984	.09489	.10007	.10537	.11079	.11632	**7**
54	.03290	.03608	.03941	.04287	.04648	.05022	.05410	.05812	.06227	.06655	.07097	.07551	.08019	.08499	.08992	.09498	.10016	.10546	.11088	.11642	**6**
55	.03295	.03614	.03946	.04293	.04654	.05028	.05417	.05819	.06234	.06662	.07104	.07559	.08027	.08507	.09001	.09506	.10025	.10555	.11097	.11651	**5**
56	.03300	.03619	.03952	.04299	.04660	.05035	.05423	.05825	.06241	.06670	.07112	.07567	.08035	.08516	.09009	.09515	.10033	.10564	.11106	.11660	**4**
57	.03305	.03624	.03958	.04305	.04666	.05041	.05430	.05832	.06248	.06677	.07119	.07574	.08043	.08524	.09017	.09524	.10042	.10573	.11115	.11670	**3**
58	.03311	.03630	.03963	.04311	.04672	.05048	.05436	.05839	.06255	.06684	.07127	.07582	.08051	.08532	.09026	.09532	.10051	.10582	.11124	.11679	**2**
59	.03316	.03635	.03969	.04317	.04678	.05054	.05443	.05846	.06262	.06691	.07134	.07590	.08059	.08540	.09034	.09541	.10059	.10591	.11134	.11688	**1**
60	.03321	.03641	.03975	.04323	.04685	.05060	.05450	.05853	.06269	.06699	.07142	.07598	.08066	.08548	.09042	.09549	.10068	.10599	.11143	.11698	**0**
' \ °	**339**	**338**	**337**	**336**	**335**	**334**	**333**	**332**	**331**	**330**	**329**	**328**	**327**	**326**	**325**	**324**	**323**	**322**	**321**	**320**	**° / "**

NATURAL HAVERSINES

' \ °	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	° / "
0	.11698	.12265	.12843	.13432	.14033	.14645	.15267	.15900	.16543	.17197	.17861	.18534	.19217	.19909	.20611	.21321	.22040	.22768	.23504	.24248	**60**
1	.11707	.12274	.12852	.13442	.14043	.14655	.15278	.15911	.16554	.17208	.17872	.18545	.19228	.19921	.20623	.21333	.22052	.22780	.23516	.24261	**59**
2	.11716	.12266	.12862	.13452	.14053	.14665	.15288	.15921	.16565	.17219	.17883	.18557	.19240	.19932	.20634	.21345	.22064	.22792	.23529	.24273	**58**
3	.11726	.12293	.12872	.13462	.14063	.14676	.15298	.15932	.16576	.17230	.17894	.18568	.19251	.19944	.20646	.21357	.22077	.22805	.23541	.24286	**57**
4	.11735	.12303	.12882	.13472	.14073	.14686	.15309	.15943	.16587	.17241	.17905	.18579	.19263	.19956	.20658	.21369	.22089	.22817	.23553	.24298	**56**
5	.11745	.12312	.12891	.13482	.14084	.14696	.15319	.15953	.16598	.17252	.17916	.18591	.19274	.19967	.20670	.21381	.22101	.22829	.23566	.24310	**55**
6	.11754	.12322	.12901	.13492	.14094	.14706	.15330	.15964	.16608	.17263	.17928	.18602	.19286	.19979	.20681	.21393	.22113	.22841	.23578	.24323	**54**
7	.11763	.12331	.12911	.13502	.14104	.14717	.15340	.15975	.16619	.17274	.17939	.18613	.19297	.19991	.20693	.21405	.22125	.22853	.23590	.24335	**53**
8	.11773	.12341	.12921	.13512	.14114	.14727	.15351	.15985	.16630	.17285	.17950	.18624	.19309	.20002	.20705	.21417	.22137	.22866	.23603	.24348	**52**
9	.11782	.12351	.12930	.13522	.14124	.14737	.15361	.15996	.16641	.17296	.17961	.18636	.19320	.20014	.20717	.21429	.22149	.22878	.23615	.24360	**51**
10	.11791	.12360	.12940	.13532	.14134	.14748	.15372	.16007	.16652	.17307	.17972	.18647	.19332	.20026	.20729	.21440	.22161	.22890	.23627	.24373	**50**
11	.11801	.12370	.12950	.13542	.14144	.14758	.15382	.16017	.16663	.17318	.17983	.18658	.19343	.20037	.20740	.21452	.22173	.22902	.23640	.24385	**49**
12	.11810	.12379	.12960	.13552	.14154	.14768	.15393	.16028	.16673	.17329	.17995	.18670	.19355	.20049	.20752	.21464	.22185	.22915	.23652	.24398	**48**
13	.11820	.12389	.12970	.13562	.14165	.14779	.15403	.16039	.16684	.17340	.18006	.18681	.19366	.20060	.20764	.21476	.22197	.22927	.23665	.24410	**47**
14	.11829	.12398	.12979	.13571	.14175	.14789	.15414	.16049	.16695	.17351	.18017	.18692	.19378	.20072	.20776	.21488	.22209	.22939	.23677	.24423	**46**
15	.11838	.12408	.12989	.13581	.14185	.14799	.15424	.16060	.16706	.17362	.18028	.18704	.19389	.20084	.20788	.21500	.22221	.22951	.23689	.24435	**45**
16	.11848	.12418	.12999	.13591	.14195	.14810	.15435	.16071	.16717	.17373	.18039	.18715	.19401	.20095	.20799	.21512	.22234	.22964	.23702	.24448	**44**
17	.11857	.12427	.13009	.13601	.14205	.14820	.15445	.16081	.16728	.17384	.18050	.18727	.19412	.20107	.20811	.21524	.22246	.22976	.23714	.24460	**43**
18	.11867	.12437	.13018	.13611	.14215	.14830	.15456	.16092	.16738	.17395	.18062	.18738	.19424	.20119	.20823	.21536	.22258	.22988	.23726	.24473	**42**
19	.11876	.12446	.13028	.13621	.14226	.14841	.15466	.16103	.16749	.17406	.18073	.18749	.19435	.20130	.20835	.21548	.22270	.23000	.23739	.24485	**41**
20	.11885	.12456	.13038	.13631	.14236	.14851	.15477	.16113	.16760	.17417	.18084	.18761	.19447	.20142	.20847	.21560	.22282	.23012	.23751	.24498	**40**
21	.11895	.12466	.13048	.13641	.14246	.14861	.15487	.16124	.16771	.17428	.18095	.18772	.19458	.20154	.20858	.21572	.22294	.23025	.23764	.24510	**39**
22	.11904	.12475	.13058	.13651	.14256	.14872	.15498	.16135	.16782	.17439	.18106	.18783	.19470	.20165	.20870	.21584	.22306	.23037	.23776	.24523	**38**
23	.11914	.12485	.13067	.13661	.14266	.14882	.15508	.16145	.16793	.17450	.18118	.18795	.19481	.20177	.20882	.21596	.22318	.23049	.23788	.24535	**37**
24	.11923	.12494	.13077	.13671	.14276	.14892	.15519	.16156	.16804	.17461	.18129	.18806	.19493	.20189	.20894	.21608	.22330	.23061	.23801	.24548	**36**
25	.11933	.12504	.13087	.13681	.14287	.14903	.15530	.16167	.16815	.17472	.18140	.18817	.19504	.20200	.20906	.21620	.22343	.23074	.23813	.24560	**35**
26	.11942	.12514	.13097	.13691	.14297	.14913	.15540	.16178	.16825	.17483	.18151	.18829	.19516	.20212	.20918	.21632	.22355	.23086	.23825	.24573	**34**
27	.11951	.12523	.13107	.13701	.14307	.14923	.15551	.16188	.16836	.17494	.18162	.18840	.19527	.20224	.20929	.21644	.22367	.23098	.23838	.24585	**33**
28	.11961	.12533	.13116	.13711	.14317	.14934	.15561	.16199	.16847	.17505	.18174	.18852	.19539	.20235	.20941	.21656	.22379	.23110	.23850	.24598	**32**
29	.11970	.12543	.13126	.13721	.14327	.14944	.15572	.16210	.16858	.17517	.18185	.18863	.19550	.20247	.20953	.21668	.22391	.23123	.23863	.24611	**31**
30	.11980	.12552	.13136	.13731	.14337	.14955	.15582	.16220	.16869	.17528	.18196	.18874	.19562	.20259	.20965	.21680	.22403	.23135	.23875	.24623	**30**
31	.11989	.12562	.13146	.13741	.14348	.14965	.15593	.16231	.16880	.17539	.18207	.18886	.19573	.20271	.20977	.21692	.22415	.23147	.23887	.24636	**29**
32	.11999	.12571	.13156	.13751	.14358	.14975	.15603	.16242	.16891	.17550	.18219	.18897	.19585	.20282	.20989	.21704	.22427	.23160	.23900	.24648	**28**
33	.12008	.12581	.13166	.13761	.14368	.14986	.15614	.16253	.16902	.17561	.18230	.18908	.19597	.20294	.21000	.21716	.22440	.23172	.23912	.24661	**27**
34	.12018	.12591	.13175	.13771	.14378	.14996	.15624	.16263	.16913	.17572	.18241	.18920	.19608	.20306	.21012	.21728	.22452	.23184	.23925	.24673	**26**
35	.12027	.12600	.13185	.13781	.14388	.15006	.15635	.16274	.16923	.17583	.18252	.18931	.19620	.20317	.21024	.21740	.22464	.23196	.23937	.24686	**25**
36	.12036	.12610	.13195	.13791	.14399	.15017	.15646	.16285	.16934	.17594	.18263	.18943	.19631	.20329	.21036	.21752	.22476	.23209	.23950	.24698	**24**
37	.12046	.12620	.13205	.13801	.14409	.15027	.15656	.16296	.16945	.17605	.18275	.18954	.19643	.20341	.21048	.21764	.22488	.23221	.23962	.24711	**23**
38	.12055	.12629	.13215	.13811	.14419	.15038	.15667	.16306	.16956	.17616	.18286	.18965	.19654	.20352	.21060	.21776	.22500	.23233	.23974	.24723	**22**
39	.12065	.12639	.13225	.13822	.14429	.15048	.15677	.16317	.16967	.17627	.18297	.18977	.19666	.20364	.21072	.21788	.22512	.23246	.23987	.24736	**21**
40	.12074	.12649	.13235	.13832	.14440	.15058	.15688	.16328	.16978	.17638	.18308	.18988	.19677	.20376	.21083	.21800	.22525	.23258	.23999	.24749	**20**
41	.12084	.12658	.13244	.13842	.14450	.15069	.15698	.16339	.16989	.17649	.18320	.19000	.19689	.20388	.21095	.21812	.22537	.23270	.24012	.24761	**19**
42	.12093	.12668	.13254	.13852	.14460	.15079	.15709	.16349	.17000	.17661	.18331	.19011	.19701	.20399	.21107	.21824	.22549	.23282	.24024	.24774	**18**
43	.12103	.12678	.13264	.13862	.14470	.15090	.15720	.16360	.17011	.17672	.18342	.19022	.19712	.20411	.21119	.21836	.22561	.23295	.24036	.24786	**17**
44	.12112	.12687	.13274	.13872	.14480	.15100	.15730	.16371	.17022	.17683	.18353	.19034	.19724	.20423	.21131	.21848	.22573	.23307	.24049	.24799	**16**
45	.12122	.12697	.13284	.13882	.14491	.15110	.15741	.16382	.17033	.17694	.18365	.19045	.19735	.20435	.21143	.21860	.22585	.23319	.24061	.24811	**15**
46	.12131	.12707	.13294	.13892	.14501	.15121	.15751	.16392	.17044	.17705	.18376	.19057	.19747	.20446	.21155	.21872	.22598	.23332	.24074	.24824	**14**
47	.12141	.12717	.13304	.13902	.14511	.15131	.15762	.16403	.17055	.17716	.18387	.19068	.19758	.20458	.21167	.21884	.22610	.23344	.24086	.24836	**13**
48	.12150	.12726	.13314	.13912	.14521	.15142	.15773	.16414	.17066	.17727	.18399	.19080	.19770	.20470	.21178	.21896	.22622	.23356	.24099	.24849	**12**
49	.12160	.12736	.13323	.13922	.14532	.15152	.15783	.16425	.17076	.17738	.18410	.19091	.19782	.20481	.21190	.21908	.22634	.23368	.24111	.24862	**11**
50	.12169	.12746	.13333	.13932	.14542	.15163	.15794	.16436	.17087	.17749	.18421	.19102	.19793	.20493	.21202	.21920	.22646	.23381	.24124	.24874	**10**
51	.12179	.12755	.13343	.13942	.14552	.15173	.15804	.16446	.17098	.17760	.18432	.19114	.19805	.20505	.21214	.21932	.22658	.23393	.24136	.24887	**9**
52	.12188	.12765	.13353	.13952	.14562	.15183	.15815	.16457	.17109	.17772	.18444	.19125	.19816	.20517	.21226	.21944	.22671	.23405	.24148	.24899	**8**
53	.12198	.12775	.13363	.13962	.14573	.15194	.15826	.16468	.17120	.17783	.18455	.19137	.19828	.20528	.21238	.21956	.22683	.23418	.24161	.24912	**7**
54	.12207	.12784	.13373	.13972	.14583	.15204	.15836	.16479	.17131	.17794	.18466	.19148	.19840	.20540	.21250	.21968	.22695	.23430	.24173	.24924	**6**
55	.12217	.12794	.13383	.13983	.14593	.15215	.15847	.16489	.17142	.17805	.18477	.19160	.19851	.20552	.21262	.21980	.22707	.23442	.24186	.24937	**5**
56	.12226	.12804	.13393	.13993	.14604	.15225	.15858	.16500	.17153	.17816	.18489	.19171	.19863	.20564	.21274	.21992	.22719	.23455	.24198	.24950	**4**
57	.12236	.12814	.13403	.14003	.14614	.15236	.15868	.16511	.17164	.17827	.18500	.19183	.19874	.20575	.21285	.22004	.22731	.23467	.24211	.24962	**3**
58	.12245	.12823	.13412	.14013	.14624	.15246	.15879	.16522	.17175	.17838	.18511	.19194	.19886	.20587	.21297	.22016	.22744	.23479	.24223	.24975	**2**
59	.12255	.12833	.13422	.14023	.14634	.15257	.15889	.16533	.17186	.17849	.18523	.19205	.19898	.20599	.21309	.22028	.22756	.23492	.24236	.24987	**1**
60	.12265	.12843	.13432	.14033	.14645	.15267	.15900	.16543	.17197	.17861	.18534	.19217	.19909	.20611	.21321	.22040	.22768	.23504	.24248	.25000	**0**
' \ °	**319**	**318**	**317**	**316**	**315**	**314**	**313**	**312**	**311**	**310**	**309**	**308**	**307**	**306**	**305**	**304**	**303**	**302**	**301**	**300**	**° / "**

NATURAL HAVERSINES

' \ °	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	° / "
0	.25000	.25760	.26526	.27300	.28081	.28869	.29663	.30463	.31270	.32082	.32899	.33722	.34549	.35381	.36218	.37059	.37904	.38752	.39604	.40460	**60**
1	.25013	.25772	.26539	.27313	.28095	.28882	.29676	.30477	.31283	.32095	.32913	.33735	.34563	.35395	.36232	.37073	.37918	.38767	.39619	.40474	**59**
2	.25025	.25763	.26552	.27326	.28108	.28895	.29690	.30490	.31297	.32109	.32926	.33749	.34577	.35409	.36246	.37087	.37932	.38781	.39633	.40488	**58**
3	.25038	.25798	.26565	.27339	.28121	.28909	.29703	.30504	.31310	.32122	.32940	.33763	.34591	.35423	.36260	.37101	.37946	.38795	.39647	.40502	**57**
4	.25050	.25810	.26578	.27352	.28134	.28922	.29716	.30517	.31324	.32136	.32954	.33777	.34604	.35437	.36274	.37115	.37960	.38809	.39661	.40517	**56**
5	.25063	.25823	.26591	.27365	.28147	.28935	.29730	.30530	.31337	.32150	.32967	.33790	.34618	.35451	.36288	.37129	.37974	.38823	.39676	.40531	**55**
6	.25076	.25836	.26604	.27378	.28160	.28948	.29743	.30544	.31351	.32163	.32981	.33804	.34632	.35465	.36302	.37143	.37989	.38837	.39690	.40545	**54**
7	.25088	.25849	.26616	.27391	.28173	.28961	.29756	.30557	.31364	.32177	.32995	.33818	.34646	.35479	.36316	.37157	.38003	.38852	.39704	.40560	**53**
8	.25101	.25861	.26629	.27404	.28186	.28975	.29770	.30571	.31378	.32190	.33008	.33832	.34660	.35493	.36330	.37171	.38017	.38866	.39718	.40574	**52**
9	.25113	.25874	.26642	.27417	.28199	.28988	.29783	.30584	.31391	.32204	.33022	.33845	.34674	.35507	.36344	.37186	.38031	.38880	.39732	.40588	**51**
10	.25126	.25887	.26655	.27430	.28212	.29001	.29796	.30597	.31405	.32217	.33036	.33859	.34688	.35521	.36358	.37200	.38045	.38894	.39747	.40602	**50**
11	.25139	.25900	.26668	.27443	.28225	.29014	.29809	.30611	.31418	.32231	.33049	.33873	.34701	.35534	.36372	.37214	.38059	.38908	.39761	.40617	**49**
12	.25151	.25912	.26681	.27456	.28238	.29027	.29823	.30624	.31432	.32245	.33063	.33887	.34715	.35548	.36386	.37228	.38073	.38923	.39775	.40631	**48**
13	.25164	.25925	.26694	.27469	.28252	.29041	.29836	.30638	.31445	.32258	.33077	.33900	.34729	.35562	.36400	.37242	.38087	.38937	.39789	.40645	**47**
14	.25177	.25938	.26706	.27482	.28265	.29054	.29849	.30651	.31459	.32272	.33090	.33914	.34743	.35576	.36414	.37256	.38102	.38951	.39804	.40660	**46**
15	.25189	.25951	.26719	.27495	.28278	.29067	.29863	.30664	.31472	.32285	.33104	.33928	.34757	.35590	.36428	.37270	.38116	.38965	.39818	.40674	**45**
16	.25202	.25963	.26732	.27508	.28291	.29080	.29876	.30678	.31486	.32299	.33118	.33942	.34771	.35604	.36442	.37284	.38130	.38979	.39832	.40688	**44**
17	.25214	.25976	.26745	.27521	.28304	.29093	.29889	.30691	.31499	.32313	.33132	.33956	.34784	.35618	.36456	.37298	.38144	.38994	.39846	.40702	**43**
18	.25227	.25989	.26758	.27534	.28317	.29107	.29903	.30705	.31513	.32326	.33145	.33969	.34798	.35632	.36470	.37312	.38158	.39008	.39861	.40717	**42**
19	.25240	.26002	.26771	.27547	.28330	.29120	.29916	.30718	.31526	.32340	.33159	.33983	.34812	.35646	.36484	.37326	.38172	.39022	.39875	.40731	**41**
20	.25252	.26014	.26784	.27560	.28343	.29133	.29929	.30732	.31540	.32353	.33173	.33997	.34826	.35660	.36498	.37340	.38186	.39036	.39889	.40745	**40**
21	.25265	.26027	.26797	.27573	.28356	.29146	.29943	.30745	.31553	.32367	.33186	.34011	.34840	.35674	.36512	.37354	.38200	.39050	.39903	.40760	**39**
22	.25278	.26040	.26809	.27586	.28369	.29160	.29956	.30758	.31567	.32381	.33200	.34024	.34854	.35688	.36526	.37368	.38215	.39064	.39918	.40774	**38**
23	.25290	.26053	.26822	.27599	.28383	.29173	.29969	.30772	.31580	.32394	.33214	.34038	.34868	.35702	.36540	.37382	.38229	.39079	.39932	.40788	**37**
24	.25303	.26065	.26835	.27612	.28396	.29186	.29983	.30785	.31594	.32408	.33227	.34052	.34882	.35716	.36554	.37397	.38243	.39093	.39946	.40802	**36**
25	.25316	.26078	.26848	.27625	.28409	.29199	.29996	.30799	.31607	.32422	.33241	.34066	.34895	.35730	.36568	.37411	.38257	.39107	.39960	.40817	**35**
26	.25328	.26091	.26861	.27638	.28422	.29212	.30009	.30812	.31621	.32435	.33255	.34080	.34909	.35743	.36582	.37425	.38271	.39121	.39975	.40831	**34**
27	.25341	.26104	.26874	.27651	.28435	.29226	.30023	.30826	.31634	.32449	.33269	.34093	.34923	.35757	.36596	.37439	.38285	.39135	.39989	.40845	**33**
28	.25354	.26117	.26887	.27664	.28448	.29239	.30036	.30839	.31648	.32462	.33282	.34107	.34937	.35771	.36610	.37453	.38299	.39150	.40003	.40860	**32**
29	.25366	.26129	.26900	.27677	.28461	.29252	.30049	.30852	.31661	.32476	.33296	.34121	.34951	.35785	.36624	.37467	.38314	.39164	.40017	.40874	**31**
30	.25379	.26142	.26913	.27690	.28474	.29265	.30063	.30866	.31675	.32490	.33310	.34135	.34965	.35799	.36638	.37481	.38328	.39178	.40032	.40888	**30**
31	.25391	.26155	.26925	.27703	.28488	.29279	.30076	.30879	.31688	.32503	.33323	.34149	.34979	.35813	.36652	.37495	.38342	.39192	.40046	.40903	**29**
32	.25404	.26168	.26938	.27716	.28501	.29292	.30089	.30893	.31702	.32517	.33337	.34162	.34992	.35827	.36666	.37509	.38356	.39206	.40060	.40917	**28**
33	.25417	.26180	.26951	.27729	.28514	.29305	.30103	.30906	.31716	.32531	.33351	.34176	.35006	.35841	.36680	.37523	.38370	.39221	.40074	.40931	**27**
34	.25429	.26193	.26964	.27742	.28527	.29318	.30116	.30920	.31729	.32544	.33365	.34190	.35020	.35855	.36694	.37537	.38384	.39235	.40089	.40945	**26**
35	.25442	.26206	.26977	.27755	.28540	.29332	.30129	.30933	.31743	.32558	.33378	.34204	.35034	.35869	.36708	.37551	.38398	.39249	.40103	.40960	**25**
36	.25455	.26219	.26990	.27768	.28553	.29345	.30143	.30946	.31756	.32571	.33392	.34218	.35048	.35883	.36722	.37566	.38413	.39263	.40117	.40974	**24**
37	.25467	.26232	.27003	.27781	.28566	.29358	.30156	.30960	.31770	.32585	.33406	.34231	.35062	.35897	.36736	.37580	.38427	.39277	.40131	.40988	**23**
38	.25480	.26244	.27016	.27794	.28580	.29371	.30169	.30973	.31783	.32599	.33419	.34245	.35076	.35911	.36750	.37594	.38441	.39292	.40146	.41003	**22**
39	.25493	.26257	.27029	.27807	.28593	.29385	.30183	.30987	.31797	.32612	.33433	.34259	.35090	.35925	.36764	.37608	.38455	.39306	.40160	.41017	**21**
40	.25506	.26270	.27042	.27820	.28606	.29398	.30196	.31000	.31810	.32626	.33447	.34273	.35103	.35939	.36778	.37622	.38469	.39320	.40174	.41031	**20**
41	.25518	.26283	.27055	.27833	.28619	.29411	.30209	.31014	.31824	.32640	.33461	.34287	.35117	.35953	.36792	.37636	.38483	.39334	.40188	.41046	**19**
42	.25531	.26296	.27068	.27846	.28632	.29424	.30223	.31027	.31837	.32653	.33474	.34300	.35131	.35967	.36806	.37650	.38498	.39348	.40203	.41060	**18**
43	.25544	.26308	.27080	.27859	.28645	.29438	.30236	.31041	.31851	.32667	.33488	.34314	.35145	.35981	.36820	.37664	.38512	.39363	.40217	.41074	**17**
44	.25556	.26321	.27093	.27873	.28658	.29451	.30249	.31054	.31865	.32681	.33502	.34328	.35159	.35995	.36834	.37678	.38526	.39377	.40231	.41089	**16**
45	.25569	.26334	.27106	.27886	.28672	.29464	.30263	.31068	.31878	.32694	.33515	.34342	.35173	.36009	.36848	.37692	.38540	.39391	.40245	.41103	**15**
46	.25582	.26347	.27119	.27899	.28685	.29477	.30276	.31081	.31892	.32708	.33529	.34356	.35187	.36023	.36862	.37706	.38554	.39405	.40260	.41117	**14**
47	.25594	.26360	.27132	.27912	.28698	.29491	.30290	.31094	.31905	.32721	.33543	.34369	.35201	.36036	.36877	.37721	.38568	.39420	.40274	.41131	**13**
48	.25607	.26372	.27145	.27925	.28711	.29504	.30303	.31108	.31919	.32735	.33557	.34383	.35215	.36050	.36891	.37735	.38582	.39434	.40288	.41146	**12**
49	.25620	.26385	.27158	.27938	.28724	.29517	.30316	.31121	.31932	.32749	.33570	.34397	.35228	.36064	.36905	.37749	.38597	.39448	.40303	.41160	**11**
50	.25632	.26398	.27171	.27951	.28737	.29530	.30330	.31135	.31946	.32762	.33584	.34411	.35242	.36078	.36919	.37763	.38611	.39462	.40317	.41174	**10**
51	.25645	.26411	.27184	.27964	.28751	.29544	.30343	.31148	.31959	.32776	.33598	.34425	.35256	.36092	.36933	.37777	.38625	.39476	.40331	.41189	**9**
52	.25658	.26424	.27197	.27977	.28764	.29557	.30356	.31162	.31973	.32790	.33612	.34439	.35270	.36106	.36947	.37791	.38639	.39491	.40345	.41203	**8**
53	.25671	.26437	.27210	.27990	.28777	.29570	.30370	.31175	.31987	.32803	.33625	.34452	.35284	.36120	.36961	.37805	.38653	.39505	.40360	.41217	**7**
54	.25683	.26449	.27223	.28003	.28790	.29583	.30383	.31189	.32000	.32817	.33639	.34466	.35298	.36134	.36975	.37819	.38667	.39519	.40374	.41232	**6**
55	.25696	.26462	.27236	.28016	.28803	.29597	.30397	.31202	.32014	.32831	.33653	.34480	.35312	.36148	.36989	.37833	.38682	.39533	.40388	.41246	**5**
56	.25709	.26475	.27249	.28029	.28816	.29610	.30410	.31216	.32027	.32844	.33667	.34494	.35326	.36162	.37003	.37847	.38696	.39548	.40402	.41260	**4**
57	.25721	.26488	.27262	.28042	.28830	.29623	.30423	.31229	.32041	.32858	.33680	.34508	.35340	.36176	.37017	.37862	.38710	.39562	.40417	.41275	**3**
58	.25734	.26501	.27275	.28055	.28843	.29637	.30437	.31243	.32054	.32872	.33694	.34521	.35354	.36190	.37031	.37876	.38724	.39576	.40431	.41289	**2**
59	.25747	.26514	.27288	.28068	.28856	.29650	.30450	.31256	.32068	.32885	.33708	.34535	.35368	.36204	.37045	.37890	.38738	.39590	.40445	.41303	**1**
60	.25760	.26526	.27300	.28081	.28869	.29663	.30463	.31270	.32082	.32899	.33722	.34549	.35381	.36218	.37059	.37904	.38752	.39604	.40460	.41318	**0**
' \ °	**299**	**298**	**297**	**296**	**295**	**294**	**293**	**292**	**291**	**290**	**289**	**288**	**287**	**286**	**285**	**284**	**283**	**282**	**281**	**280**	**° / "**

NATURAL HAVERSINES

' \ °	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	° / "
0	.41318	.42178	.43041	.43907	.44774	.45642	.46512	.47383	.48255	.49127	.50000	.50873	.51745	.52617	.53488	.54358	.55226	.56093	.56959	.57822	**60**
1	.41332	.42193	.43056	.43921	.44788	.45657	.46527	.47398	.48270	.49142	.50015	.50887	.51760	.52631	.53502	.54372	.55241	.56108	.56973	.57836	**59**
2	.41346	.42184	.43070	.43935	.44803	.45671	.46541	.47412	.48284	.49156	.50029	.50902	.51774	.52646	.53517	.54387	.55255	.56122	.56987	.57850	**58**
3	.41361	.42221	.43085	.43950	.44817	.45686	.46556	.47427	.48299	.49171	.50044	.50916	.51789	.52660	.53531	.54401	.55270	.56137	.57002	.57865	**57**
4	.41375	.42236	.43099	.43964	.44831	.45700	.46570	.47441	.48313	.49186	.50058	.50931	.51803	.52675	.53546	.54416	.55284	.56151	.57016	.57879	**56**
5	.41389	.42250	.43113	.43979	.44846	.45715	.46585	.47456	.48328	.49200	.50073	.50945	.51818	.52689	.53560	.54430	.55299	.56166	.57031	.57894	**55**
6	.41404	.42264	.43128	.43993	.44860	.45729	.46599	.47470	.48342	.49215	.50087	.50960	.51832	.52704	.53575	.54445	.55313	.56180	.57045	.57908	**54**
7	.41418	.42279	.43142	.44008	.44875	.45744	.46614	.47485	.48357	.49229	.50102	.50974	.51847	.52718	.53589	.54459	.55328	.56195	.57059	.57922	**53**
8	.41432	.42293	.43157	.44022	.44889	.45758	.46628	.47499	.48371	.49244	.50116	.50989	.51861	.52733	.53604	.54474	.55342	.56209	.57074	.57937	**52**
9	.41447	.42308	.43171	.44036	.44904	.45773	.46643	.47514	.48386	.49258	.50131	.51003	.51876	.52748	.53618	.54488	.55357	.56223	.57088	.57951	**51**
10	.41461	.42322	.43185	.44051	.44918	.45787	.46657	.47528	.48400	.49273	.50145	.51018	.51890	.52762	.53633	.54503	.55371	.56238	.57103	.57965	**50**
11	.41475	.42336	.43200	.44065	.44933	.45802	.46672	.47543	.48415	.49287	.50160	.51033	.51905	.52777	.53647	.54517	.55386	.56252	.57117	.57980	**49**
12	.41490	.42351	.43214	.44080	.44947	.45816	.46686	.47558	.48429	.49302	.50175	.51047	.51919	.52791	.53662	.54532	.55400	.56267	.57131	.57994	**48**
13	.41504	.42365	.43229	.44094	.44962	.45831	.46701	.47572	.48444	.49316	.50189	.51062	.51934	.52806	.53676	.54546	.55414	.56281	.57146	.58008	**47**
14	.41518	.42379	.43243	.44109	.44976	.45845	.46715	.47587	.48459	.49331	.50204	.51076	.51948	.52820	.53691	.54561	.55429	.56296	.57160	.58023	**46**
15	.41533	.42394	.43257	.44123	.44991	.45860	.46730	.47601	.48473	.49346	.50218	.51091	.51963	.52835	.53705	.54575	.55443	.56310	.57175	.58037	**45**
16	.41547	.42408	.43272	.44138	.45005	.45874	.46744	.47616	.48488	.49360	.50233	.51105	.51978	.52849	.53720	.54590	.55458	.56324	.57189	.58051	**44**
17	.41561	.42423	.43286	.44152	.45020	.45889	.46759	.47630	.48502	.49375	.50247	.51120	.51992	.52864	.53734	.54604	.55472	.56339	.57203	.58066	**43**
18	.41576	.42437	.43301	.44166	.45034	.45903	.46773	.47645	.48517	.49389	.50262	.51134	.52007	.52878	.53749	.54619	.55487	.56353	.57218	.58080	**42**
19	.41590	.42451	.43315	.44181	.45048	.45918	.46788	.47659	.48531	.49404	.50276	.51149	.52021	.52893	.53763	.54633	.55501	.56368	.57232	.58095	**41**
20	.41604	.42466	.43330	.44195	.45063	.45932	.46802	.47674	.48546	.49418	.50291	.51163	.52036	.52907	.53778	.54647	.55516	.56382	.57247	.58109	**40**
21	.41619	.42480	.43344	.44210	.45077	.45947	.46817	.47688	.48560	.49433	.50305	.51178	.52050	.52922	.53792	.54662	.55530	.56397	.57261	.58123	**39**
22	.41633	.42494	.43358	.44224	.45092	.45961	.46831	.47703	.48575	.49447	.50320	.51193	.52065	.52936	.53807	.54676	.55545	.56411	.57275	.58138	**38**
23	.41647	.42509	.43373	.44239	.45106	.45976	.46846	.47717	.48589	.49462	.50335	.51207	.52079	.52951	.53821	.54691	.55559	.56425	.57290	.58152	**37**
24	.41662	.42523	.43387	.44253	.45121	.45990	.46860	.47732	.48604	.49476	.50349	.51222	.52094	.52965	.53836	.54705	.55573	.56440	.57304	.58166	**36**
25	.41676	.42538	.43402	.44268	.45135	.46005	.46875	.47746	.48618	.49491	.50364	.51236	.52108	.52980	.53850	.54720	.55588	.56454	.57319	.58181	**35**
26	.41690	.42552	.43416	.44282	.45150	.46019	.46890	.47761	.48633	.49505	.50378	.51251	.52123	.52994	.53865	.54734	.55602	.56469	.57333	.58195	**34**
27	.41705	.42566	.43430	.44296	.45164	.46034	.46904	.47775	.48648	.49520	.50393	.51265	.52137	.53009	.53879	.54749	.55617	.56483	.57347	.58209	**33**
28	.41719	.42581	.43445	.44311	.45179	.46048	.46919	.47790	.48662	.49535	.50407	.51280	.52152	.53023	.53894	.54763	.55631	.56497	.57362	.58224	**32**
29	.41733	.42595	.43459	.44325	.45193	.46063	.46933	.47805	.48677	.49549	.50422	.51294	.52166	.53038	.53908	.54778	.55646	.56512	.57376	.58238	**31**
30	.41748	.42610	.43474	.44340	.45208	.46077	.46948	.47819	.48691	.49564	.50436	.51309	.52181	.53052	.53923	.54792	.55660	.56526	.57390	.58252	**30**
31	.41762	.42624	.43488	.44354	.45222	.46092	.46962	.47834	.48706	.49578	.50451	.51323	.52195	.53067	.53937	.54807	.55675	.56541	.57405	.58267	**29**
32	.41776	.42638	.43503	.44369	.45237	.46106	.46977	.47848	.48720	.49593	.50465	.51338	.52210	.53081	.53952	.54821	.55689	.56555	.57419	.58281	**28**
33	.41791	.42653	.43517	.44383	.45251	.46121	.46991	.47863	.48735	.49607	.50480	.51352	.52225	.53096	.53966	.54836	.55704	.56570	.57434	.58295	**27**
34	.41805	.42667	.43531	.44398	.45266	.46135	.47006	.47877	.48749	.49622	.50495	.51367	.52239	.53110	.53981	.54850	.55718	.56584	.57448	.58310	**26**
35	.41819	.42681	.43546	.44412	.45280	.46150	.47020	.47892	.48764	.49636	.50509	.51382	.52254	.53125	.53995	.54865	.55732	.56598	.57462	.58324	**25**
36	.41834	.42696	.43560	.44427	.45295	.46164	.47035	.47906	.48778	.49651	.50524	.51396	.52268	.53140	.54010	.54879	.55747	.56613	.57477	.58338	**24**
37	.41848	.42710	.43575	.44441	.45309	.46179	.47049	.47921	.48793	.49665	.50538	.51411	.52283	.53154	.54024	.54894	.55761	.56627	.57491	.58353	**23**
38	.41862	.42725	.43589	.44455	.45324	.46193	.47064	.47935	.48807	.49680	.50553	.51425	.52297	.53169	.54039	.54908	.55776	.56642	.57506	.58367	**22**
39	.41877	.42739	.43603	.44470	.45338	.46208	.47078	.47950	.48822	.49695	.50567	.51440	.52312	.53183	.54053	.54923	.55790	.56656	.57520	.58381	**21**
40	.41891	.42753	.43618	.44484	.45353	.46222	.47093	.47964	.48837	.49709	.50582	.51454	.52326	.53198	.54068	.54937	.55805	.56670	.57534	.58396	**20**
41	.41905	.42768	.43632	.44499	.45367	.46237	.47107	.47979	.48851	.49724	.50596	.51469	.52341	.53212	.54082	.54952	.55819	.56685	.57549	.58410	**19**
42	.41920	.42782	.43647	.44513	.45381	.46251	.47122	.47993	.48866	.49738	.50611	.51483	.52355	.53227	.54097	.54966	.55834	.56699	.57563	.58424	**18**
43	.41934	.42797	.43661	.44528	.45396	.46266	.47136	.48008	.48880	.49753	.50625	.51498	.52370	.53241	.54111	.54980	.55848	.56714	.57577	.58439	**17**
44	.41949	.42811	.43676	.44542	.45410	.46280	.47151	.48022	.48895	.49767	.50640	.51512	.52384	.53256	.54126	.54995	.55862	.56728	.57592	.58453	**16**
45	.41963	.42825	.43690	.44557	.45425	.46295	.47165	.48037	.48909	.49782	.50654	.51527	.52399	.53270	.54140	.55009	.55877	.56743	.57606	.58467	**15**
46	.41977	.42840	.43704	.44571	.45439	.46309	.47180	.48052	.48924	.49796	.50669	.51541	.52413	.53285	.54155	.55024	.55891	.56757	.57621	.58482	**14**
47	.41992	.42854	.43719	.44586	.45454	.46324	.47194	.48066	.48938	.49811	.50684	.51556	.52428	.53299	.54169	.55038	.55906	.56771	.57635	.58496	**13**
48	.42006	.42869	.43733	.44600	.45468	.46338	.47209	.48081	.48953	.49825	.50698	.51571	.52442	.53314	.54184	.55053	.55920	.56786	.57649	.58510	**12**
49	.42020	.42883	.43748	.44614	.45483	.46353	.47223	.48095	.48967	.49840	.50713	.51585	.52457	.53328	.54198	.55067	.55935	.56800	.57664	.58525	**11**
50	.42035	.42897	.43762	.44629	.45497	.46367	.47238	.48110	.48982	.49855	.50727	.51600	.52472	.53343	.54213	.55082	.55949	.56815	.57678	.58539	**10**
51	.42049	.42912	.43777	.44643	.45512	.46382	.47252	.48124	.48997	.49869	.50742	.51614	.52486	.53357	.54227	.55096	.55964	.56829	.57692	.58553	**9**
52	.42063	.42926	.43791	.44658	.45526	.46396	.47267	.48139	.49011	.49884	.50756	.51629	.52501	.53372	.54242	.55111	.55978	.56843	.57707	.58568	**8**
53	.42078	.42941	.43805	.44672	.45541	.46411	.47282	.48153	.49026	.49898	.50771	.51643	.52515	.53386	.54256	.55125	.55992	.56858	.57721	.58582	**7**
54	.42092	.42955	.43820	.44687	.45555	.46425	.47296	.48168	.49040	.49913	.50785	.51658	.52530	.53401	.54271	.55140	.56007	.56872	.57736	.58596	**6**
55	.42106	.42969	.43834	.44701	.45570	.46440	.47311	.48182	.49055	.49927	.50800	.51672	.52544	.53415	.54285	.55154	.56021	.56887	.57750	.58611	**5**
56	.42121	.42984	.43849	.44716	.45584	.46454	.47325	.48197	.49069	.49942	.50814	.51687	.52559	.53430	.54300	.55169	.56036	.56901	.57764	.58625	**4**
57	.42135	.42998	.43863	.44730	.45599	.46469	.47340	.48211	.49084	.49956	.50829	.51701	.52573	.53444	.54314	.55183	.56050	.56915	.57779	.58639	**3**
58	.42150	.43013	.43878	.44745	.45613	.46483	.47354	.48226	.49098	.49971	.50844	.51716	.52588	.53459	.54329	.55197	.56065	.56930	.57793	.58654	**2**
59	.42164	.43027	.43892	.44759	.45628	.46498	.47369	.48240	.49113	.49985	.50858	.51730	.52602	.53473	.54343	.55212	.56079	.56944	.57807	.58668	**1**
60	.42178	.43041	.43907	.44774	.45642	.46512	.47383	.48255	.49127	.50000	.50873	.51745	.52617	.53488	.54358	.55226	.56093	.56959	.57822	.58682	**0**
' \ °	**279**	**278**	**277**	**276**	**275**	**274**	**273**	**272**	**271**	**270**	**269**	**268**	**267**	**266**	**265**	**264**	**263**	**262**	**261**	**260**	**° / "**

NATURAL HAVERSINES

' \ °	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	° / "
0	.58682	.59540	.60396	.61248	.62096	.62941	.63782	.64619	.65451	.66278	.67101	.67918	.68730	.69537	.70337	.71131	.71919	.72700	.73474	.74240	**60**
1	.58697	.59555	.60410	.61262	.62110	.62955	.63796	.64632	.65465	.66292	.67115	.67932	.68744	.69550	.70350	.71144	.71932	.72712	.73486	.74253	**59**
2	.58711	.59549	.60424	.61276	.62124	.62969	.63810	.64646	.65479	.66306	.67128	.67946	.68757	.69563	.70363	.71157	.71945	.72725	.73499	.74266	**58**
3	.58725	.59583	.60438	.61290	.62138	.62983	.63824	.64660	.65492	.66320	.67142	.67959	.68771	.69577	.70377	.71170	.71958	.72738	.73512	.74279	**57**
4	.58740	.59598	.60452	.61304	.62153	.62997	.63838	.64674	.65506	.66333	.67156	.67973	.68784	.69590	.70390	.71184	.71971	.72751	.73525	.74291	**56**
5	.58754	.59612	.60467	.61318	.62167	.63011	.63852	.64688	.65520	.66347	.67169	.67986	.68798	.69603	.70403	.71197	.71984	.72764	.73538	.74304	**55**
6	.58768	.59626	.60481	.61333	.62181	.63025	.63866	.64702	.65534	.66361	.67183	.68000	.68811	.69617	.70417	.71210	.71997	.72777	.73551	.74317	**54**
7	.58783	.59640	.60495	.61347	.62195	.63039	.63880	.64716	.65548	.66375	.67197	.68013	.68825	.69630	.70430	.71223	.72010	.72790	.73563	.74329	**53**
8	.58797	.59655	.60509	.61361	.62209	.63053	.63894	.64730	.65561	.66388	.67210	.68027	.68838	.69644	.70443	.71236	.72023	.72803	.73576	.74342	**52**
9	.58811	.59669	.60524	.61375	.62223	.63067	.63908	.64744	.65575	.66402	.67224	.68041	.68852	.69657	.70456	.71249	.72036	.72816	.73589	.74355	**51**
10	.58826	.59683	.60538	.61389	.62237	.63081	.63922	.64758	.65589	.66416	.67238	.68054	.68865	.69670	.70470	.71263	.72049	.72829	.73602	.74368	**50**
11	.58840	.59697	.60552	.61403	.62251	.63095	.63936	.64772	.65603	.66430	.67251	.68068	.68879	.69684	.70483	.71276	.72062	.72842	.73615	.74380	**49**
12	.58854	.59712	.60566	.61418	.62265	.63109	.63950	.64785	.65617	.66443	.67265	.68081	.68892	.69697	.70496	.71289	.72075	.72855	.73628	.74393	**48**
13	.58869	.59726	.60580	.61432	.62279	.63123	.63964	.64799	.65631	.66457	.67279	.68095	.68906	.69710	.70509	.71302	.72088	.72868	.73640	.74406	**47**
14	.58883	.59740	.60595	.61446	.62294	.63138	.63977	.64813	.65644	.66471	.67292	.68108	.68919	.69724	.70523	.71315	.72101	.72881	.73653	.74418	**46**
15	.58897	.59755	.60609	.61460	.62308	.63152	.63991	.64827	.65658	.66485	.67306	.68122	.68932	.69737	.70536	.71328	.72114	.72894	.73666	.74431	**45**
16	.58911	.59769	.60623	.61474	.62322	.63166	.64005	.64841	.65672	.66498	.67319	.68135	.68946	.69751	.70549	.71342	.72127	.72907	.73679	.74444	**44**
17	.58926	.59783	.60637	.61488	.62336	.63180	.64019	.64855	.65686	.66512	.67333	.68149	.68959	.69764	.70562	.71355	.72141	.72920	.73692	.74456	**43**
18	.58940	.59797	.60652	.61502	.62350	.63194	.64033	.64869	.65700	.66526	.67347	.68163	.68973	.69777	.70576	.71368	.72154	.72932	.73704	.74469	**42**
19	.58954	.59812	.60666	.61517	.62364	.63208	.64047	.64883	.65713	.66539	.67360	.68176	.68986	.69791	.70589	.71381	.72167	.72945	.73717	.74482	**41**
20	.58969	.59826	.60680	.61531	.62378	.63222	.64061	.64897	.65727	.66553	.67374	.68190	.69000	.69804	.70602	.71394	.72180	.72958	.73730	.74494	**40**
21	.58983	.59840	.60694	.61545	.62392	.63236	.64075	.64910	.65741	.66567	.67388	.68203	.69013	.69817	.70615	.71407	.72193	.72971	.73743	.74507	**39**
22	.58997	.59854	.60708	.61559	.62406	.63250	.64089	.64924	.65755	.66581	.67401	.68217	.69027	.69831	.70629	.71420	.72206	.72984	.73756	.74520	**38**
23	.59012	.59869	.60723	.61573	.62420	.63264	.64103	.64938	.65769	.66594	.67415	.68230	.69040	.69844	.70642	.71434	.72219	.72997	.73768	.74533	**37**
24	.59026	.59883	.60737	.61587	.62434	.63278	.64117	.64952	.65782	.66608	.67429	.68244	.69054	.69857	.70655	.71447	.72232	.73010	.73781	.74545	**36**
25	.59040	.59897	.60751	.61602	.62449	.63292	.64131	.64966	.65796	.66622	.67442	.68257	.69067	.69871	.70668	.71460	.72245	.73023	.73794	.74558	**35**
26	.59055	.59911	.60765	.61616	.62463	.63306	.64145	.64980	.65810	.66635	.67456	.68271	.69080	.69884	.70682	.71473	.72258	.73036	.73807	.74571	**34**
27	.59069	.59926	.60779	.61630	.62477	.63320	.64159	.64994	.65824	.66649	.67469	.68284	.69094	.69897	.70695	.71486	.72271	.73049	.73820	.74583	**33**
28	.59083	.59940	.60794	.61644	.62491	.63334	.64173	.65008	.65838	.66663	.67483	.68298	.69107	.69911	.70708	.71499	.72284	.73062	.73832	.74596	**32**
29	.59097	.59954	.60808	.61658	.62505	.63348	.64187	.65021	.65851	.66677	.67497	.68312	.69121	.69924	.70721	.71512	.72297	.73075	.73845	.74609	**31**
30	.59112	.59968	.60822	.61672	.62519	.63362	.64201	.65035	.65865	.66690	.67510	.68325	.69134	.69937	.70735	.71526	.72310	.73087	.73858	.74621	**30**
31	.59126	.59983	.60836	.61686	.62533	.63376	.64215	.65049	.65879	.66704	.67524	.68339	.69148	.69951	.70748	.71539	.72323	.73100	.73871	.74634	**29**
32	.59140	.59997	.60850	.61701	.62547	.63390	.64229	.65063	.65893	.66718	.67538	.68352	.69161	.69964	.70761	.71552	.72336	.73113	.73883	.74646	**28**
33	.59155	.60011	.60865	.61715	.62561	.63404	.64243	.65077	.65907	.66731	.67551	.68366	.69174	.69977	.70774	.71565	.72349	.73126	.73896	.74659	**27**
34	.59169	.60025	.60879	.61729	.62575	.63418	.64257	.65091	.65920	.66745	.67565	.68379	.69188	.69991	.70788	.71578	.72362	.73139	.73909	.74672	**26**
35	.59183	.60040	.60893	.61743	.62589	.63432	.64270	.65105	.65934	.66759	.67578	.68393	.69201	.70004	.70801	.71591	.72375	.73152	.73922	.74684	**25**
36	.59198	.60054	.60907	.61757	.62603	.63446	.64284	.65118	.65948	.66773	.67592	.68406	.69215	.70017	.70814	.71604	.72388	.73165	.73935	.74697	**24**
37	.59212	.60068	.60921	.61771	.62618	.63460	.64298	.65132	.65962	.66786	.67606	.68420	.69228	.70031	.70827	.71617	.72401	.73178	.73947	.74710	**23**
38	.59226	.60082	.60936	.61785	.62632	.63474	.64312	.65146	.65976	.66800	.67619	.68433	.69242	.70044	.70840	.71631	.72414	.73191	.73960	.74722	**22**
39	.59240	.60097	.60950	.61800	.62646	.63488	.64326	.65160	.65989	.66814	.67633	.68447	.69255	.70057	.70854	.71644	.72427	.73203	.73973	.74735	**21**
40	.59255	.60111	.60964	.61814	.62660	.63502	.64340	.65174	.66003	.66827	.67647	.68460	.69268	.70071	.70867	.71657	.72440	.73216	.73986	.74748	**20**
41	.59269	.60125	.60978	.61828	.62674	.63516	.64354	.65188	.66017	.66841	.67660	.68474	.69282	.70084	.70880	.71670	.72453	.73229	.73998	.74760	**19**
42	.59283	.60139	.60992	.61842	.62688	.63530	.64368	.65202	.66031	.66855	.67674	.68487	.69295	.70097	.70893	.71683	.72466	.73242	.74011	.74773	**18**
43	.59298	.60154	.61006	.61856	.62702	.63544	.64382	.65216	.66044	.66868	.67687	.68501	.69309	.70111	.70907	.71696	.72479	.73255	.74024	.74786	**17**
44	.59312	.60168	.61021	.61870	.62716	.63558	.64396	.65229	.66058	.66882	.67701	.68514	.69322	.70124	.70920	.71709	.72492	.73268	.74037	.74798	**16**
45	.59326	.60182	.61035	.61884	.62730	.63572	.64410	.65243	.66072	.66896	.67715	.68528	.69336	.70137	.70933	.71722	.72505	.73281	.74049	.74811	**15**
46	.59340	.60196	.61049	.61898	.62744	.63586	.64424	.65257	.66086	.66910	.67728	.68541	.69349	.70151	.70946	.71735	.72518	.73294	.74062	.74823	**14**
47	.59355	.60211	.61063	.61913	.62758	.63600	.64438	.65271	.66100	.66923	.67742	.68555	.69362	.70164	.70959	.71748	.72531	.73306	.74075	.74836	**13**
48	.59369	.60225	.61077	.61927	.62772	.63614	.64452	.65285	.66113	.66937	.67755	.68568	.69376	.70177	.70973	.71762	.72544	.73319	.74088	.74849	**12**
49	.59383	.60239	.61092	.61941	.62786	.63628	.64466	.65299	.66127	.66951	.67769	.68582	.69389	.70191	.70986	.71775	.72557	.73332	.74100	.74861	**11**
50	.59398	.60253	.61106	.61955	.62800	.63642	.64479	.65312	.66141	.66964	.67783	.68595	.69403	.70204	.70999	.71788	.72570	.73345	.74113	.74874	**10**
51	.59412	.60268	.61120	.61969	.62814	.63656	.64493	.65326	.66155	.66978	.67796	.68609	.69416	.70217	.71012	.71801	.72583	.73358	.74126	.74887	**9**
52	.59426	.60282	.61134	.61983	.62829	.63670	.64507	.65340	.66168	.66992	.67810	.68622	.69429	.70230	.71025	.71814	.72596	.73371	.74139	.74899	**8**
53	.59440	.60296	.61148	.61997	.62843	.63684	.64521	.65354	.66182	.67005	.67823	.68636	.69443	.70244	.71039	.71827	.72609	.73384	.74151	.74912	**7**
54	.59455	.60310	.61163	.62011	.62857	.63698	.64535	.65368	.66196	.67019	.67837	.68649	.69456	.70257	.71052	.71840	.72622	.73396	.74164	.74924	**6**
55	.59469	.60324	.61177	.62026	.62871	.63712	.64549	.65382	.66210	.67033	.67850	.68663	.69470	.70270	.71065	.71853	.72635	.73409	.74177	.74937	**5**
56	.59483	.60339	.61191	.62040	.62885	.63726	.64563	.65396	.66223	.67046	.67864	.68676	.69483	.70284	.71078	.71866	.72648	.73422	.74190	.74950	**4**
57	.59498	.60353	.61205	.62054	.62899	.63740	.64577	.65409	.66237	.67060	.67878	.68690	.69496	.70297	.71091	.71879	.72661	.73435	.74202	.74962	**3**
58	.59512	.60367	.61219	.62068	.62913	.63754	.64591	.65423	.66251	.67074	.67891	.68703	.69510	.70310	.71105	.71892	.72674	.73448	.74215	.74975	**2**
59	.59526	.60381	.61233	.62082	.62927	.63768	.64605	.65437	.66265	.67087	.67905	.68717	.69523	.70324	.71118	.71905	.72687	.73461	.74228	.74987	**1**
60	.59540	.60396	.61248	.62096	.62941	.63782	.64619	.65451	.66278	.67101	.67918	.68730	.69537	.70337	.71131	.71919	.72700	.73474	.74240	.75000	**0**
' \ °	**259**	**258**	**257**	**256**	**255**	**254**	**253**	**252**	**251**	**250**	**249**	**248**	**247**	**246**	**245**	**244**	**243**	**242**	**241**	**240**	**° / "**

NATURAL HAVERSINES

' \ °	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	° / "
0	.75000	.75752	.76496	.77232	.77960	.78679	.79389	.80091	.80783	.81466	.82139	.82803	.83457	.84100	.84733	.85355	.85967	.86568	.87157	.87735	60
1	.75013	.75764	.76508	.77244	.77972	.78691	.79401	.80102	.80795	.81477	.82151	.82814	.83467	.84111	.84743	.85366	.85977	.86578	.87167	.87745	59
2	.75025	.75761	.76521	.77256	.77984	.78703	.79413	.80114	.80806	.81489	.82162	.82825	.83478	.84121	.84754	.85376	.85987	.86588	.87177	.87755	58
3	.75038	.75789	.76533	.77269	.77996	.78715	.79425	.80126	.80817	.81500	.82173	.82836	.83489	.84132	.84764	.85386	.85997	.86597	.87186	.87764	57
4	.75050	.75802	.76545	.77281	.78008	.78726	.79436	.80137	.80829	.81511	.82184	.82847	.83500	.84142	.84775	.85396	.86007	.86607	.87196	.87774	56
5	.75063	.75814	.76558	.77293	.78020	.78738	.79448	.80149	.80840	.81523	.82195	.82858	.83511	.84153	.84785	.85407	.86017	.86617	.87206	.87783	55
6	.75076	.75827	.76570	.77305	.78032	.78750	.79460	.80160	.80852	.81534	.82206	.82869	.83521	.84164	.84796	.85417	.86028	.86627	.87216	.87793	54
7	.75088	.75839	.76582	.77317	.78044	.78762	.79472	.80172	.80863	.81545	.82217	.82880	.83532	.84174	.84806	.85427	.86038	.86637	.87225	.87802	53
8	.75101	.75852	.76595	.77329	.78056	.78774	.79483	.80184	.80875	.81556	.82228	.82891	.83543	.84185	.84817	.85438	.86048	.86647	.87235	.87812	52
9	.75113	.75864	.76607	.77342	.78068	.78786	.79495	.80195	.80886	.81568	.82240	.82902	.83554	.84196	.84827	.85448	.86058	.86657	.87245	.87821	51
10	.75126	.75876	.76619	.77354	.78080	.78798	.79507	.80207	.80898	.81579	.82251	.82913	.83564	.84206	.84837	.85458	.86068	.86667	.87254	.87831	50
11	.75138	.75889	.76632	.77366	.78092	.78810	.79519	.80218	.80909	.81590	.82262	.82924	.83575	.84217	.84848	.85468	.86078	.86677	.87264	.87840	49
12	.75151	.75901	.76644	.77378	.78104	.78822	.79530	.80230	.80920	.81601	.82273	.82934	.83586	.84227	.84858	.85479	.86088	.86686	.87274	.87850	48
13	.75164	.75914	.76656	.77390	.78116	.78833	.79542	.80242	.80932	.81613	.82284	.82945	.83597	.84238	.84869	.85489	.86098	.86696	.87283	.87859	47
14	.75176	.75926	.76668	.77402	.78128	.78845	.79554	.80253	.80943	.81624	.82295	.82956	.83608	.84249	.84879	.85499	.86108	.86706	.87293	.87869	46
15	.75189	.75939	.76681	.77415	.78140	.78857	.79565	.80265	.80955	.81635	.82306	.82967	.83618	.84259	.84890	.85509	.86118	.86716	.87303	.87878	45
16	.75201	.75951	.76693	.77427	.78152	.78869	.79577	.80276	.80966	.81647	.82317	.82978	.83629	.84270	.84900	.85520	.86128	.86726	.87313	.87888	44
17	.75214	.75964	.76705	.77439	.78164	.78881	.79589	.80288	.80978	.81658	.82328	.82989	.83640	.84280	.84910	.85530	.86138	.86736	.87322	.87897	43
18	.75226	.75976	.76718	.77451	.78176	.78893	.79601	.80299	.80989	.81669	.82339	.83000	.83651	.84291	.84921	.85540	.86148	.86746	.87332	.87907	42
19	.75239	.75988	.76730	.77463	.78188	.78905	.79612	.80311	.81000	.81680	.82351	.83011	.83661	.84302	.84931	.85550	.86158	.86756	.87342	.87916	41
20	.75251	.76001	.76742	.77475	.78200	.78917	.79624	.80323	.81012	.81692	.82362	.83022	.83672	.84312	.84942	.85560	.86168	.86765	.87351	.87926	40
21	.75264	.76013	.76754	.77488	.78212	.78928	.79636	.80334	.81023	.81703	.82373	.83033	.83683	.84323	.84952	.85571	.86178	.86775	.87361	.87935	39
22	.75277	.76026	.76767	.77500	.78224	.78940	.79648	.80346	.81035	.81714	.82384	.83044	.83694	.84333	.84962	.85581	.86189	.86785	.87371	.87945	38
23	.75289	.76038	.76779	.77512	.78236	.78952	.79659	.80357	.81046	.81725	.82395	.83055	.83704	.84344	.84973	.85591	.86199	.86795	.87380	.87954	37
24	.75302	.76050	.76791	.77524	.78248	.78964	.79671	.80369	.81057	.81737	.82406	.83066	.83715	.84354	.84983	.85601	.86209	.86805	.87390	.87964	36
25	.75314	.76063	.76804	.77536	.78260	.78976	.79683	.80380	.81069	.81748	.82417	.83077	.83726	.84365	.84994	.85612	.86219	.86815	.87400	.87973	35
26	.75327	.76075	.76816	.77548	.78272	.78988	.79694	.80392	.81080	.81759	.82428	.83087	.83737	.84376	.85004	.85622	.86229	.86825	.87409	.87982	34
27	.75339	.76088	.76828	.77560	.78284	.79000	.79706	.80403	.81092	.81770	.82439	.83098	.83747	.84386	.85014	.85632	.86239	.86834	.87419	.87992	33
28	.75352	.76100	.76840	.77573	.78296	.79011	.79718	.80415	.81103	.81781	.82450	.83109	.83758	.84397	.85025	.85642	.86249	.86844	.87429	.88001	32
29	.75364	.76113	.76853	.77585	.78308	.79023	.79729	.80427	.81114	.81793	.82461	.83120	.83769	.84407	.85035	.85652	.86259	.86854	.87438	.88011	31
30	.75377	.76125	.76865	.77597	.78320	.79035	.79741	.80438	.81126	.81804	.82472	.83131	.83780	.84418	.85045	.85663	.86269	.86864	.87448	.88020	30
31	.75389	.76137	.76877	.77609	.78332	.79047	.79753	.80450	.81137	.81815	.82483	.83142	.83790	.84428	.85056	.85673	.86279	.86874	.87457	.88030	29
32	.75402	.76150	.76890	.77621	.78344	.79059	.79765	.80461	.81148	.81826	.82495	.83153	.83801	.84439	.85066	.85683	.86289	.86884	.87467	.88039	28
33	.75415	.76162	.76902	.77633	.78356	.79071	.79776	.80473	.81160	.81838	.82506	.83164	.83812	.84449	.85077	.85693	.86299	.86893	.87477	.88049	27
34	.75427	.76175	.76914	.77645	.78368	.79082	.79788	.80484	.81171	.81849	.82517	.83175	.83822	.84460	.85087	.85703	.86309	.86903	.87486	.88058	26
35	.75440	.76187	.76926	.77657	.78380	.79094	.79800	.80496	.81183	.81860	.82528	.83185	.83833	.84470	.85097	.85713	.86319	.86913	.87496	.88067	25
36	.75452	.76199	.76939	.77670	.78392	.79106	.79811	.80507	.81194	.81871	.82539	.83196	.83844	.84481	.85108	.85724	.86329	.86923	.87506	.88077	24
37	.75465	.76212	.76951	.77682	.78404	.79118	.79823	.80519	.81205	.81882	.82550	.83207	.83855	.84492	.85118	.85734	.86339	.86933	.87515	.88086	23
38	.75477	.76224	.76963	.77694	.78416	.79130	.79835	.80530	.81217	.81894	.82561	.83218	.83865	.84502	.85128	.85744	.86349	.86942	.87525	.88096	22
39	.75490	.76236	.76975	.77706	.78428	.79142	.79846	.80542	.81228	.81905	.82572	.83229	.83876	.84513	.85139	.85754	.86359	.86952	.87534	.88105	21
40	.75502	.76249	.76988	.77718	.78440	.79153	.79858	.80553	.81239	.81916	.82583	.83240	.83887	.84523	.85149	.85764	.86369	.86962	.87544	.88115	20
41	.75515	.76261	.77000	.77730	.78452	.79165	.79870	.80565	.81251	.81927	.82594	.83251	.83897	.84534	.85159	.85774	.86379	.86972	.87554	.88124	19
42	.75527	.76274	.77012	.77742	.78464	.79177	.79881	.80576	.81262	.81938	.82605	.83262	.83908	.84544	.85170	.85785	.86389	.86982	.87563	.88133	18
43	.75540	.76286	.77024	.77754	.78476	.79189	.79893	.80588	.81273	.81950	.82616	.83272	.83919	.84555	.85180	.85795	.86399	.86991	.87573	.88143	17
44	.75552	.76298	.77036	.77766	.78488	.79201	.79905	.80599	.81285	.81961	.82627	.83283	.83929	.84565	.85190	.85805	.86409	.87001	.87582	.88152	16
45	.75565	.76311	.77049	.77779	.78500	.79212	.79916	.80611	.81296	.81972	.82638	.83294	.83940	.84576	.85201	.85815	.86419	.87011	.87592	.88162	15
46	.75577	.76323	.77061	.77791	.78512	.79224	.79928	.80622	.81308	.81983	.82649	.83305	.83951	.84586	.85211	.85825	.86429	.87021	.87602	.88171	14
47	.75590	.76335	.77073	.77803	.78524	.79236	.79940	.80634	.81319	.81994	.82660	.83316	.83961	.84597	.85221	.85835	.86438	.87030	.87611	.88180	13
48	.75602	.76348	.77085	.77815	.78536	.79248	.79951	.80645	.81330	.82005	.82671	.83327	.83972	.84607	.85232	.85846	.86448	.87040	.87621	.88190	12
49	.75615	.76360	.77098	.77827	.78548	.79260	.79963	.80657	.81342	.82017	.82682	.83337	.83983	.84618	.85242	.85856	.86458	.87050	.87630	.88199	11
50	.75627	.76373	.77110	.77839	.78560	.79271	.79974	.80668	.81353	.82028	.82693	.83348	.83993	.84628	.85252	.85866	.86468	.87060	.87640	.88209	10
51	.75640	.76385	.77122	.77851	.78571	.79283	.79986	.80680	.81364	.82039	.82704	.83359	.84004	.84639	.85263	.85876	.86478	.87070	.87649	.88218	9
52	.75652	.76397	.77134	.77863	.78583	.79295	.79998	.80691	.81376	.82050	.82715	.83370	.84015	.84649	.85273	.85886	.86488	.87079	.87659	.88227	8
53	.75665	.76410	.77147	.77875	.78595	.79307	.80009	.80703	.81387	.82061	.82726	.83381	.84025	.84660	.85283	.85896	.86498	.87089	.87669	.88237	7
54	.75677	.76422	.77159	.77887	.78607	.79319	.80021	.80714	.81398	.82072	.82737	.83392	.84036	.84670	.85294	.85906	.86508	.87099	.87678	.88246	6
55	.75690	.76434	.77171	.77899	.78619	.79330	.80033	.80726	.81409	.82084	.82748	.83402	.84047	.84681	.85304	.85916	.86518	.87109	.87688	.88255	5
56	.75702	.76447	.77183	.77911	.78631	.79342	.80044	.80737	.81421	.82095	.82759	.83413	.84057	.84691	.85314	.85927	.86528	.87118	.87697	.88265	4
57	.75714	.76459	.77195	.77923	.78643	.79354	.80056	.80749	.81432	.82106	.82770	.83424	.84068	.84702	.85324	.85937	.86538	.87128	.87707	.88274	3
58	.75727	.76471	.77208	.77936	.78655	.79366	.80068	.80760	.81443	.82117	.82781	.83435	.84079	.84712	.85335	.85947	.86548	.87138	.87716	.88284	2
59	.75739	.76484	.77220	.77948	.78667	.79377	.80079	.80772	.81455	.82128	.82792	.83446	.84089	.84722	.85345	.85957	.86558	.87148	.87726	.88293	1
60	.75752	.76496	.77232	.77960	.78679	.79389	.80091	.80783	.81466	.82139	.82803	.83457	.84100	.84733	.85355	.85967	.86568	.87157	.87735	.88302	0
' \ °	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224	223	222	221	220	° / "

NATURAL HAVERSINES

' \ °	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	° / "
0	.88302	.88857	.89401	.89932	.90451	.90958	.91452	.91934	.92402	.92858	.93301	.93731	.94147	.94550	.94940	.95315	.95677	.96025	.96359	.96679	60
1	.88312	.88866	.89409	.89941	.90459	.90966	.91460	.91941	.92410	.92866	.93309	.93738	.94154	.94557	.94946	.95322	.95683	.96031	.96365	.96684	59
2	.88321	.88865	.89418	.89949	.90468	.90974	.91468	.91949	.92418	.92873	.93316	.93745	.94161	.94564	.94952	.95328	.95689	.96037	.96370	.96689	58
3	.88330	.88885	.89427	.89958	.90476	.90983	.91476	.91957	.92426	.92881	.93323	.93752	.94168	.94570	.94959	.95334	.95695	.96042	.96376	.96695	57
4	.88340	.88894	.89436	.89967	.90485	.90991	.91484	.91965	.92433	.92888	.93330	.93759	.94175	.94577	.94965	.95340	.95701	.96048	.96381	.96700	56
5	.88349	.88903	.89445	.89975	.90494	.90999	.91493	.91973	.92441	.92896	.93338	.93766	.94181	.94583	.94972	.95346	.95707	.96054	.96386	.96705	55
6	.88358	.88912	.89454	.89984	.90502	.91008	.91501	.91981	.92449	.92903	.93345	.93773	.94188	.94590	.94978	.95352	.95713	.96059	.96392	.96710	54
7	.88368	.88921	.89463	.89993	.90511	.91016	.91509	.91989	.92456	.92911	.93352	.93780	.94195	.94596	.94984	.95358	.95719	.96065	.96397	.96715	53
8	.88377	.88930	.89472	.90002	.90519	.91024	.91517	.91997	.92464	.92918	.93359	.93787	.94202	.94603	.94991	.95364	.95724	.96071	.96403	.96721	52
9	.88386	.88940	.89481	.90010	.90528	.91033	.91525	.92005	.92472	.92926	.93367	.93794	.94209	.94610	.94997	.95371	.95730	.96076	.96408	.96726	51
10	.88396	.88949	.89490	.90019	.90536	.91041	.91533	.92013	.92479	.92933	.93374	.93801	.94215	.94616	.95003	.95377	.95736	.96082	.96413	.96731	50
11	.88405	.88958	.89499	.90028	.90545	.91049	.91541	.92020	.92487	.92941	.93381	.93808	.94222	.94623	.95010	.95383	.95742	.96088	.96419	.96736	49
12	.88414	.88967	.89508	.90037	.90553	.91057	.91549	.92028	.92495	.92948	.93388	.93815	.94229	.94629	.95016	.95389	.95748	.96093	.96424	.96741	48
13	.88423	.88976	.89517	.90045	.90562	.91066	.91557	.92036	.92502	.92955	.93395	.93822	.94236	.94636	.95022	.95395	.95754	.96099	.96430	.96746	47
14	.88433	.88985	.89526	.90054	.90570	.91074	.91565	.92044	.92510	.92963	.93403	.93829	.94243	.94642	.95029	.95401	.95760	.96104	.96435	.96752	46
15	.88442	.88994	.89534	.90063	.90579	.91082	.91573	.92052	.92518	.92970	.93410	.93836	.94249	.94649	.95035	.95407	.95766	.96110	.96440	.96757	45
16	.88451	.89003	.89543	.90071	.90587	.91091	.91582	.92060	.92525	.92978	.93417	.93843	.94256	.94655	.95041	.95413	.95771	.96116	.96446	.96762	44
17	.88461	.89012	.89552	.90080	.90596	.91099	.91590	.92068	.92533	.92985	.93424	.93850	.94263	.94662	.95048	.95419	.95777	.96121	.96451	.96767	43
18	.88470	.89022	.89561	.90089	.90604	.91107	.91598	.92076	.92541	.92993	.93432	.93857	.94270	.94669	.95054	.95425	.95783	.96127	.96457	.96772	42
19	.88479	.89031	.89570	.90097	.90613	.91115	.91606	.92083	.92548	.93000	.93439	.93864	.94276	.94675	.95060	.95431	.95789	.96133	.96462	.96777	41
20	.88489	.89040	.89579	.90106	.90621	.91124	.91614	.92091	.92556	.93007	.93446	.93871	.94283	.94682	.95066	.95438	.95795	.96138	.96467	.96782	40
21	.88498	.89049	.89588	.90115	.90630	.91132	.91622	.92099	.92563	.93015	.93453	.93878	.94290	.94688	.95073	.95444	.95801	.96144	.96473	.96788	39
22	.88507	.89058	.89597	.90124	.90638	.91140	.91630	.92107	.92571	.93022	.93460	.93885	.94297	.94695	.95079	.95450	.95806	.96149	.96478	.96793	38
23	.88516	.89067	.89606	.90132	.90647	.91149	.91638	.92115	.92579	.93030	.93468	.93892	.94303	.94701	.95085	.95456	.95812	.96155	.96483	.96798	37
24	.88526	.89076	.89614	.90141	.90655	.91157	.91646	.92123	.92586	.93037	.93475	.93899	.94310	.94708	.95092	.95462	.95818	.96161	.96489	.96803	36
25	.88535	.89085	.89623	.90150	.90664	.91165	.91654	.92130	.92594	.93045	.93482	.93906	.94317	.94714	.95098	.95468	.95824	.96166	.96494	.96808	35
26	.88544	.89094	.89632	.90158	.90672	.91173	.91662	.92138	.92602	.93052	.93489	.93913	.94324	.94721	.95104	.95474	.95830	.96172	.96500	.96813	34
27	.88553	.89103	.89641	.90167	.90680	.91182	.91670	.92146	.92609	.93059	.93496	.93920	.94330	.94727	.95110	.95480	.95836	.96177	.96505	.96818	33
28	.88563	.89112	.89650	.90176	.90689	.91190	.91678	.92154	.92617	.93067	.93503	.93927	.94337	.94734	.95117	.95486	.95841	.96183	.96510	.96823	32
29	.88572	.89121	.89659	.90184	.90697	.91198	.91686	.92162	.92624	.93074	.93511	.93934	.94344	.94740	.95123	.95492	.95847	.96188	.96516	.96829	31
30	.88581	.89130	.89668	.90193	.90706	.91206	.91694	.92170	.92632	.93081	.93518	.93941	.94351	.94747	.95129	.95498	.95853	.96194	.96521	.96834	30
31	.88590	.89139	.89677	.90201	.90714	.91215	.91702	.92177	.92640	.93089	.93525	.93948	.94357	.94753	.95136	.95504	.95859	.96200	.96526	.96839	29
32	.88600	.89149	.89685	.90210	.90723	.91223	.91710	.92185	.92647	.93096	.93532	.93955	.94364	.94760	.95142	.95510	.95865	.96205	.96532	.96844	28
33	.88609	.89158	.89694	.90219	.90731	.91231	.91718	.92193	.92655	.93104	.93539	.93962	.94371	.94766	.95148	.95516	.95870	.96211	.96537	.96849	27
34	.88618	.89167	.89703	.90227	.90740	.91239	.91726	.92201	.92662	.93111	.93546	.93969	.94377	.94773	.95154	.95522	.95876	.96216	.96542	.96854	26
35	.88627	.89176	.89712	.90236	.90748	.91247	.91734	.92209	.92670	.93118	.93554	.93976	.94384	.94779	.95161	.95528	.95882	.96222	.96547	.96859	25
36	.88637	.89185	.89721	.90245	.90756	.91256	.91742	.92216	.92678	.93126	.93561	.93982	.94391	.94786	.95167	.95534	.95888	.96227	.96553	.96864	24
37	.88646	.89194	.89730	.90253	.90765	.91264	.91750	.92224	.92685	.93133	.93568	.93989	.94397	.94792	.95173	.95540	.95894	.96233	.96558	.96869	23
38	.88655	.89203	.89738	.90262	.90773	.91272	.91758	.92232	.92693	.93140	.93575	.93996	.94404	.94799	.95179	.95546	.95899	.96238	.96563	.96874	22
39	.88664	.89212	.89747	.90271	.90782	.91280	.91766	.92240	.92700	.93148	.93582	.94003	.94411	.94805	.95185	.95552	.95905	.96244	.96569	.96879	21
40	.88674	.89221	.89756	.90279	.90790	.91289	.91774	.92248	.92708	.93155	.93589	.94010	.94418	.94811	.95192	.95558	.95911	.96249	.96574	.96884	20
41	.88683	.89230	.89765	.90288	.90798	.91297	.91782	.92255	.92715	.93162	.93596	.94017	.94424	.94818	.95198	.95564	.95917	.96255	.96579	.96889	19
42	.88692	.89239	.89774	.90296	.90807	.91305	.91790	.92263	.92723	.93170	.93603	.94024	.94431	.94824	.95204	.95570	.95922	.96260	.96585	.96894	18
43	.88701	.89248	.89782	.90305	.90815	.91313	.91798	.92271	.92730	.93177	.93611	.94031	.94438	.94831	.95210	.95576	.95928	.96266	.96590	.96899	17
44	.88710	.89257	.89791	.90314	.90824	.91321	.91806	.92279	.92738	.93184	.93618	.94038	.94444	.94837	.95217	.95582	.95934	.96272	.96595	.96905	16
45	.88720	.89266	.89800	.90322	.90832	.91329	.91814	.92286	.92746	.93192	.93625	.94045	.94451	.94844	.95223	.95588	.95940	.96277	.96600	.96910	15
46	.88729	.89275	.89809	.90331	.90840	.91338	.91822	.92294	.92753	.93199	.93632	.94051	.94458	.94850	.95229	.95594	.95945	.96283	.96606	.96915	14
47	.88738	.89284	.89818	.90339	.90849	.91346	.91830	.92302	.92761	.93206	.93639	.94058	.94464	.94856	.95235	.95600	.95951	.96288	.96611	.96920	13
48	.88747	.89293	.89826	.90348	.90857	.91354	.91838	.92310	.92768	.93214	.93646	.94065	.94471	.94863	.95241	.95606	.95957	.96294	.96616	.96925	12
49	.88756	.89302	.89835	.90357	.90866	.91362	.91846	.92317	.92776	.93221	.93653	.94072	.94477	.94869	.95248	.95612	.95962	.96299	.96621	.96930	11
50	.88766	.89311	.89844	.90365	.90874	.91370	.91854	.92325	.92783	.93228	.93660	.94079	.94484	.94876	.95254	.95618	.95968	.96305	.96627	.96935	10
51	.88775	.89320	.89853	.90374	.90882	.91379	.91862	.92333	.92791	.93236	.93667	.94086	.94491	.94882	.95260	.95624	.95974	.96310	.96632	.96940	9
52	.88784	.89329	.89862	.90382	.90891	.91387	.91870	.92341	.92798	.93243	.93674	.94093	.94497	.94889	.95266	.95630	.95980	.96315	.96637	.96945	8
53	.88793	.89338	.89870	.90391	.90899	.91395	.91878	.92348	.92806	.93250	.93682	.94099	.94504	.94895	.95272	.95636	.95985	.96321	.96642	.96950	7
54	.88802	.89347	.89879	.90399	.90907	.91403	.91886	.92356	.92813	.93258	.93689	.94106	.94511	.94901	.95278	.95642	.95991	.96326	.96648	.96955	6
55	.88811	.89356	.89888	.90408	.90916	.91411	.91894	.92364	.92821	.93265	.93696	.94113	.94517	.94908	.95285	.95648	.95997	.96332	.96653	.96960	5
56	.88821	.89365	.89897	.90417	.90924	.91419	.91902	.92372	.92828	.93272	.93703	.94120	.94524	.94914	.95291	.95654	.96002	.96337	.96658	.96965	4
57	.88830	.89374	.89906	.90425	.90933	.91427	.91910	.92379	.92836	.93279	.93710	.94127	.94531	.94921	.95297	.95660	.96008	.96343	.96663	.96970	3
58	.88839	.89383	.89914	.90434	.90941	.91436	.91918	.92387	.92843	.93287	.93717	.94134	.94537	.94927	.95303	.95665	.96014	.96348	.96669	.96975	2
59	.88848	.89392	.89923	.90442	.90949	.91444	.91926	.92395	.92851	.93294	.93724	.94141	.94544	.94933	.95309	.95671	.96020	.96354	.96674	.96980	1
60	.88857	.89401	.89932	.90451	.90958	.91452	.91934	.92402	.92858	.93301	.93731	.94147	.94550	.94940	.95315	.95677	.96025	.96359	.96679	.96985	0
' \ °	219	218	217	216	215	214	213	212	211	210	209	208	207	206	205	204	203	202	201	200	° / "

NATURAL HAVERSINES

'\°	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	°/"
0	.96985	.97276	.97553	.97815	.98063	.98296	.98515	.98719	.98907	.99081	.99240	.99384	.99513	.99627	.99726	.99810	.99878	.99931	.99970	.99992	**60**
1	.96990	.97281	.97557	.97819	.98067	.98300	.98518	.98722	.98910	.99084	.99243	.99387	.99515	.99629	.99728	.99811	.99879	.99932	.99970	.99993	**59**
2	.96995	.97281	.97562	.97824	.98071	.98304	.98522	.98725	.98913	.99087	.99245	.99389	.99517	.99631	.99729	.99812	.99880	.99933	.99971	.99993	**58**
3	.97000	.97290	.97566	.97828	.98075	.98308	.98525	.98728	.98916	.99090	.99248	.99391	.99519	.99633	.99731	.99814	.99881	.99934	.99971	.99993	**57**
4	.97004	.97295	.97571	.97832	.98079	.98311	.98529	.98732	.98919	.99092	.99250	.99393	.99521	.99634	.99732	.99815	.99882	.99934	.99972	.99993	**56**
5	.97009	.97300	.97575	.97836	.98083	.98315	.98532	.98735	.98922	.99095	.99253	.99396	.99523	.99636	.99734	.99816	.99883	.99935	.99972	.99994	**55**
6	.97014	.97304	.97580	.97841	.98087	.98319	.98536	.98738	.98925	.99098	.99255	.99398	.99525	.99638	.99735	.99817	.99884	.99936	.99973	.99994	**54**
7	.97019	.97309	.97584	.97845	.98091	.98323	.98539	.98741	.98928	.99101	.99258	.99400	.99527	.99640	.99737	.99819	.99885	.99937	.99973	.99994	**53**
8	.97024	.97314	.97589	.97849	.98095	.98326	.98543	.98745	.98931	.99103	.99260	.99402	.99529	.99641	.99738	.99820	.99886	.99937	.99973	.99994	**52**
9	.97029	.97318	.97593	.97853	.98099	.98330	.98546	.98748	.98934	.99106	.99263	.99405	.99531	.99643	.99740	.99821	.99887	.99938	.99974	.99994	**51**
10	.97034	.97323	.97598	.97858	.98103	.98334	.98550	.98751	.98937	.99109	.99265	.99407	.99533	.99645	.99741	.99822	.99888	.99939	.99974	.99995	**50**
11	.97039	.97328	.97602	.97862	.98107	.98337	.98553	.98754	.98940	.99112	.99268	.99409	.99535	.99647	.99743	.99823	.99889	.99940	.99975	.99995	**49**
12	.97044	.97332	.97606	.97866	.98111	.98341	.98557	.98757	.98943	.99114	.99270	.99411	.99537	.99648	.99744	.99825	.99890	.99940	.99975	.99995	**48**
13	.97049	.97337	.97611	.97870	.98115	.98345	.98560	.98761	.98946	.99117	.99273	.99414	.99539	.99650	.99746	.99826	.99891	.99941	.99976	.99995	**47**
14	.97054	.97342	.97615	.97874	.98119	.98349	.98564	.98764	.98949	.99120	.99275	.99416	.99541	.99652	.99747	.99827	.99892	.99942	.99976	.99996	**46**
15	.97059	.97347	.97620	.97879	.98123	.98352	.98567	.98767	.98952	.99123	.99278	.99418	.99543	.99653	.99748	.99828	.99893	.99942	.99977	.99996	**45**
16	.97064	.97351	.97624	.97883	.98127	.98356	.98571	.98770	.98955	.99125	.99280	.99420	.99545	.99655	.99750	.99829	.99894	.99943	.99977	.99996	**44**
17	.97069	.97356	.97629	.97887	.98131	.98360	.98574	.98774	.98958	.99128	.99283	.99422	.99547	.99657	.99751	.99831	.99895	.99944	.99978	.99996	**43**
18	.97074	.97361	.97633	.97891	.98135	.98363	.98577	.98777	.98961	.99131	.99285	.99425	.99549	.99659	.99753	.99832	.99896	.99944	.99978	.99996	**42**
19	.97078	.97365	.97637	.97895	.98139	.98367	.98581	.98780	.98964	.99133	.99288	.99427	.99551	.99660	.99754	.99833	.99897	.99945	.99978	.99996	**41**
20	.97083	.97370	.97642	.97899	.98142	.98371	.98584	.98783	.98967	.99136	.99290	.99429	.99553	.99662	.99756	.99834	.99898	.99946	.99979	.99997	**40**
21	.97088	.97374	.97646	.97904	.98146	.98374	.98588	.98786	.98970	.99139	.99293	.99431	.99555	.99664	.99757	.99835	.99899	.99947	.99979	.99997	**39**
22	.97093	.97379	.97651	.97908	.98150	.98378	.98591	.98789	.98973	.99141	.99295	.99433	.99557	.99665	.99759	.99837	.99900	.99947	.99980	.99997	**38**
23	.97098	.97384	.97655	.97912	.98154	.98382	.98595	.98793	.98976	.99144	.99297	.99436	.99559	.99667	.99760	.99838	.99900	.99948	.99980	.99997	**37**
24	.97103	.97388	.97660	.97916	.98158	.98385	.98598	.98796	.98979	.99147	.99300	.99438	.99561	.99669	.99761	.99839	.99901	.99949	.99981	.99997	**36**
25	.97108	.97393	.97664	.97920	.98162	.98389	.98601	.98799	.98982	.99149	.99302	.99440	.99563	.99670	.99763	.99840	.99902	.99949	.99981	.99997	**35**
26	.97113	.97398	.97668	.97924	.98166	.98393	.98605	.98802	.98985	.99152	.99305	.99442	.99565	.99672	.99764	.99841	.99903	.99950	.99981	.99998	**34**
27	.97117	.97402	.97673	.97929	.98170	.98396	.98608	.98805	.98988	.99155	.99307	.99444	.99567	.99674	.99766	.99842	.99904	.99950	.99982	.99998	**33**
28	.97122	.97407	.97677	.97933	.98174	.98400	.98612	.98808	.98990	.99157	.99309	.99446	.99568	.99675	.99767	.99844	.99905	.99951	.99982	.99998	**32**
29	.97127	.97412	.97681	.97937	.98178	.98404	.98615	.98812	.98993	.99160	.99312	.99449	.99570	.99677	.99768	.99845	.99906	.99952	.99982	.99998	**31**
30	.97132	.97416	.97686	.97941	.98182	.98407	.98618	.98815	.98996	.99163	.99314	.99451	.99572	.99679	.99770	.99846	.99907	.99952	.99983	.99998	**30**
31	.97137	.97421	.97690	.97945	.98185	.98411	.98622	.98818	.98999	.99165	.99317	.99453	.99574	.99680	.99771	.99847	.99908	.99953	.99983	.99998	**29**
32	.97142	.97425	.97695	.97949	.98189	.98415	.98625	.98821	.99002	.99168	.99319	.99455	.99576	.99682	.99773	.99848	.99909	.99954	.99984	.99998	**28**
33	.97147	.97430	.97699	.97953	.98193	.98418	.98629	.98824	.99005	.99171	.99321	.99457	.99578	.99684	.99774	.99849	.99909	.99954	.99984	.99998	**27**
34	.97151	.97435	.97703	.97957	.98197	.98422	.98632	.98827	.99008	.99173	.99324	.99459	.99580	.99685	.99775	.99850	.99910	.99955	.99984	.99999	**26**
35	.97156	.97439	.97708	.97962	.98201	.98426	.98635	.98830	.99011	.99176	.99326	.99461	.99582	.99687	.99777	.99852	.99911	.99956	.99985	.99999	**25**
36	.97161	.97444	.97712	.97966	.98205	.98429	.98639	.98834	.99014	.99179	.99329	.99464	.99584	.99688	.99778	.99853	.99912	.99956	.99985	.99999	**24**
37	.97166	.97448	.97716	.97970	.98209	.98433	.98642	.98837	.99016	.99181	.99331	.99466	.99585	.99690	.99779	.99854	.99913	.99957	.99985	.99999	**23**
38	.97171	.97453	.97721	.97974	.98212	.98436	.98646	.98840	.99019	.99184	.99333	.99468	.99587	.99692	.99781	.99855	.99914	.99957	.99986	.99999	**22**
39	.97176	.97458	.97725	.97978	.98216	.98440	.98649	.98843	.99022	.99186	.99336	.99470	.99589	.99693	.99782	.99856	.99915	.99958	.99986	.99999	**21**
40	.97180	.97462	.97729	.97982	.98220	.98444	.98652	.98846	.99025	.99189	.99338	.99472	.99591	.99695	.99784	.99857	.99915	.99959	.99986	.99999	**20**
41	.97185	.97467	.97734	.97986	.98224	.98447	.98656	.98849	.99028	.99192	.99340	.99474	.99593	.99696	.99785	.99858	.99916	.99959	.99987	.99999	**19**
42	.97190	.97471	.97738	.97990	.98228	.98451	.98659	.98852	.99031	.99194	.99343	.99476	.99595	.99698	.99786	.99859	.99917	.99960	.99987	.99999	**18**
43	.97195	.97476	.97742	.97994	.98232	.98454	.98662	.98855	.99034	.99197	.99345	.99478	.99597	.99700	.99788	.99860	.99918	.99960	.99987	.99999	**17**
44	.97200	.97480	.97747	.97998	.98236	.98458	.98666	.98858	.99036	.99199	.99347	.99480	.99598	.99701	.99789	.99861	.99919	.99961	.99988	.99999	**16**
45	.97204	.97485	.97751	.98002	.98239	.98462	.98669	.98862	.99039	.99202	.99350	.99483	.99600	.99703	.99790	.99863	.99920	.99961	.99988	1.00000	**15**
46	.97209	.97490	.97755	.98007	.98243	.98465	.98672	.98865	.99042	.99205	.99352	.99485	.99602	.99704	.99792	.99864	.99920	.99962	.99988	1.00000	**14**
47	.97214	.97494	.97760	.98011	.98247	.98469	.98676	.98868	.99045	.99207	.99354	.99487	.99604	.99706	.99793	.99865	.99921	.99963	.99989	1.00000	**13**
48	.97219	.97499	.97764	.98015	.98251	.98472	.98679	.98871	.99048	.99210	.99357	.99489	.99606	.99708	.99794	.99866	.99922	.99963	.99989	1.00000	**12**
49	.97224	.97503	.97768	.98019	.98255	.98476	.98682	.98874	.99051	.99212	.99359	.99491	.99608	.99709	.99796	.99867	.99923	.99964	.99989	1.00000	**11**
50	.97228	.97508	.97773	.98023	.98258	.98479	.98686	.98877	.99053	.99215	.99361	.99493	.99609	.99711	.99797	.99868	.99924	.99964	.99990	1.00000	**10**
51	.97233	.97512	.97777	.98027	.98262	.98483	.98689	.98880	.99056	.99217	.99364	.99495	.99611	.99712	.99798	.99869	.99924	.99965	.99990	1.00000	**9**
52	.97238	.97517	.97781	.98031	.98266	.98487	.98692	.98883	.99059	.99220	.99366	.99497	.99613	.99714	.99799	.99870	.99925	.99965	.99990	1.00000	**8**
53	.97243	.97521	.97785	.98035	.98270	.98490	.98695	.98886	.99062	.99223	.99368	.99499	.99615	.99715	.99801	.99871	.99926	.99966	.99991	1.00000	**7**
54	.97247	.97526	.97790	.98039	.98274	.98494	.98699	.98889	.99065	.99225	.99371	.99501	.99617	.99717	.99802	.99872	.99927	.99966	.99991	1.00000	**6**
55	.97252	.97530	.97794	.98043	.98277	.98497	.98702	.98892	.99067	.99228	.99373	.99503	.99618	.99718	.99803	.99873	.99928	.99967	.99991	1.00000	**5**
56	.97257	.97535	.97798	.98047	.98281	.98501	.98705	.98895	.99070	.99230	.99375	.99505	.99620	.99720	.99805	.99874	.99928	.99967	.99991	1.00000	**4**
57	.97262	.97539	.97802	.98051	.98285	.98504	.98709	.98898	.99073	.99233	.99378	.99507	.99622	.99722	.99806	.99875	.99929	.99968	.99992	1.00000	**3**
58	.97266	.97544	.97807	.98055	.98289	.98508	.98712	.98901	.99076	.99235	.99380	.99509	.99624	.99723	.99807	.99876	.99930	.99969	.99992	1.00000	**2**
59	.97271	.97548	.97811	.98059	.98293	.98511	.98715	.98904	.99079	.99238	.99382	.99511	.99626	.99725	.99808	.99877	.99931	.99969	.99992	1.00000	**1**
60	.97276	.97553	.97815	.98063	.98296	.98515	.98719	.98907	.99081	.99240	.99384	.99513	.99627	.99726	.99810	.99878	.99931	.99970	.99992	1.00000	**0**
'\°	**199**	**198**	**197**	**196**	**195**	**194**	**193**	**192**	**191**	**190**	**189**	**188**	**187**	**186**	**185**	**184**	**183**	**182**	**181**	**180**	**°/"**

INTERPOLATION TABLE

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	
1.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	**1.0**
0.9	1	2	3	4	5	5	6	7	8	9	10	11	12	13	13	**0.9**
0.8	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12	**0.8**
0.7	1	1	2	3	4	4	5	6	6	7	8	8	9	10	10	**0.7**
0.6	1	1	2	2	3	4	4	5	5	6	7	7	8	8	9	**0.6**
0.5	0	1	1	2	3	3	3	4	4	5	5	6	6	7	7	**0.5**
0.4	0	1	1	2	2	2	3	3	4	4	4	5	5	6	6	**0.4**
0.3	0	1	1	1	2	2	2	2	3	3	3	4	4	4	4	**0.3**
0.2	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3	**0.2**
0.1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	**0.1**