College of the Holy Cross
Math 135 (Calculus I)
Log and Trig Tables

Using Function Tables

In practice, a function is only evaluated at specific numbers. Before the days of electronic calculators, textbooks had appendices containing tables of values of exponential, logarithmic, and trigonometric functions. Using these tables was more work than punching buttons on a calculator, but helped students understand mathematics deeply in important ways.

Log Tables The *common* (or *base* 10 *logarithm* of a positive real number y is the real number $x = \log_{10} y$ satisfying $y = 10^x$. We only need to tabulate values of $\log_{10} y$ for $1 \le y < 10$: Every positive real number y can be written $A \times 10^n$ for some whole number n and with $1 \le A < 10$, and then

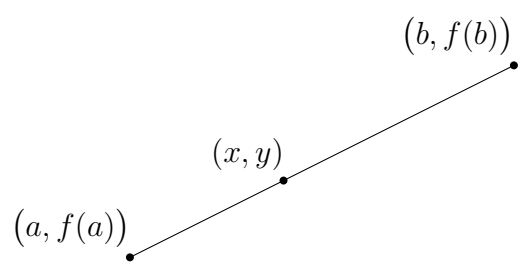
$$\log_{10} y = \log_{10}(A \times 10^n) = \log_{10} A + \log_{10} 10^n = n + \log_{10} A.$$

The *natural logarithm* of a positive real number y is the real number $x = \ln y$ satisfying $y = e^x$. For the reasons in the preceding paragraph, we only need to tabulate values of $\ln y$ for $1 \le y < 10$.

Trig Tables Because the trig functions are periodic and have additional symmetries, we only need to tabulate their values for angles between 0 and 45 degrees.

Linear Interpolation Sometimes a function f is known only at $x = a$ and $x = b$, but we need to estimate $y = f(x)$ for x between a and b. One method is *linear interpolation*.
If (x, y) lies on the line joining $\big(a, f(a)\big)$ and $\big(b, f(b)\big)$, then

$$y = f(a) + \frac{f(b) - f(a)}{b - a}(x - a).$$



Inverse Functions A function table can be used to estimate values of the inverse function. For instance, a common log table and linear interpolation can be used to estimate powers of 10.

Example 1. To estimate $\sqrt{10} = 10^{0.5}$, find the table entries bracketing 0.5: Since $\log_{10} 3.16 \approx 0.4997 < 0.5 < 0.5011 \approx \log_{10} 3.17$, we find that $10^{0.5}$ is about

$$\frac{0.5000 - 0.4997}{0.5011 - 0.4997} = \frac{3}{14} \approx 0.2$$

of the way from 3.16 to 3.17. That is,

$$10^{0.5} \approx 3.16 + 0.2 \times (3.17 - 3.16) = 3.162.$$

Common (Base 10) Logarithms

The common logarithm of 3.14 is found by going down to the row 3.1, then over to the column 0.04, to find 0.4969. The logarithm of 6.02×10^{23} is $23 + \log_{10} 6.02 \approx 23.7796$.

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.0	0.0000	0.0043	0.0086	0.0128	0.0170	0.0212	0.0253	0.0294	0.0334	0.0374
1.1	0.0414	0.0453	0.0492	0.0531	0.0569	0.0607	0.0645	0.0682	0.0719	0.0755
1.2	0.0792	0.0828	0.0864	0.0899	0.0934	0.0969	0.1004	0.1038	0.1072	0.1106
1.3	0.1139	0.1173	0.1206	0.1239	0.1271	0.1303	0.1335	0.1367	0.1399	0.1430
1.4	0.1461	0.1492	0.1523	0.1553	0.1584	0.1614	0.1644	0.1673	0.1703	0.1732
1.5	0.1761	0.1790	0.1818	0.1847	0.1875	0.1903	0.1931	0.1959	0.1987	0.2014
1.6	0.2041	0.2068	0.2095	0.2122	0.2148	0.2175	0.2201	0.2227	0.2253	0.2279
1.7	0.2304	0.2330	0.2355	0.2380	0.2405	0.2430	0.2455	0.2480	0.2504	0.2529
1.8	0.2553	0.2577	0.2601	0.2625	0.2648	0.2672	0.2695	0.2718	0.2742	0.2765
1.9	0.2788	0.2810	0.2833	0.2856	0.2878	0.2900	0.2923	0.2945	0.2967	0.2989
2.0	0.3010	0.3032	0.3054	0.3075	0.3096	0.3118	0.3139	0.3160	0.3181	0.3201
2.1	0.3222	0.3243	0.3263	0.3284	0.3304	0.3324	0.3345	0.3365	0.3385	0.3404
2.2	0.3424	0.3444	0.3464	0.3483	0.3502	0.3522	0.3541	0.3560	0.3579	0.3598
2.3	0.3617	0.3636	0.3655	0.3674	0.3692	0.3711	0.3729	0.3747	0.3766	0.3784
2.4	0.3802	0.3820	0.3838	0.3856	0.3874	0.3892	0.3909	0.3927	0.3945	0.3962
2.5	0.3979	0.3997	0.4014	0.4031	0.4048	0.4065	0.4082	0.4099	0.4116	0.4133
2.6	0.4150	0.4166	0.4183	0.4200	0.4216	0.4232	0.4249	0.4265	0.4281	0.4298
2.7	0.4314	0.4330	0.4346	0.4362	0.4378	0.4393	0.4409	0.4425	0.4440	0.4456
2.8	0.4472	0.4487	0.4502	0.4518	0.4533	0.4548	0.4564	0.4579	0.4594	0.4609
2.9	0.4624	0.4639	0.4654	0.4669	0.4683	0.4698	0.4713	0.4728	0.4742	0.4757
3.0	0.4771	0.4786	0.4800	0.4814	0.4829	0.4843	0.4857	0.4871	0.4886	0.4900
3.1	0.4914	0.4928	0.4942	0.4955	0.4969	0.4983	0.4997	0.5011	0.5024	0.5038
3.2	0.5051	0.5065	0.5079	0.5092	0.5105	0.5119	0.5132	0.5145	0.5159	0.5172
3.3	0.5185	0.5198	0.5211	0.5224	0.5237	0.5250	0.5263	0.5276	0.5289	0.5302
3.4	0.5315	0.5328	0.5340	0.5353	0.5366	0.5378	0.5391	0.5403	0.5416	0.5428
3.5	0.5441	0.5453	0.5465	0.5478	0.5490	0.5502	0.5514	0.5527	0.5539	0.5551
3.6	0.5563	0.5575	0.5587	0.5599	0.5611	0.5623	0.5635	0.5647	0.5658	0.5670
3.7	0.5682	0.5694	0.5705	0.5717	0.5729	0.5740	0.5752	0.5763	0.5775	0.5786
3.8	0.5798	0.5809	0.5821	0.5832	0.5843	0.5855	0.5866	0.5877	0.5888	0.5899
3.9	0.5911	0.5922	0.5933	0.5944	0.5955	0.5966	0.5977	0.5988	0.5999	0.6010
4.0	0.6021	0.6031	0.6042	0.6053	0.6064	0.6075	0.6085	0.6096	0.6107	0.6117
4.1	0.6128	0.6138	0.6149	0.6160	0.6170	0.6180	0.6191	0.6201	0.6212	0.6222
4.2	0.6232	0.6243	0.6253	0.6263	0.6274	0.6284	0.6294	0.6304	0.6314	0.6325
4.3	0.6335	0.6345	0.6355	0.6365	0.6375	0.6385	0.6395	0.6405	0.6415	0.6425
4.4	0.6435	0.6444	0.6454	0.6464	0.6474	0.6484	0.6493	0.6503	0.6513	0.6522
4.5	0.6532	0.6542	0.6551	0.6561	0.6571	0.6580	0.6590	0.6599	0.6609	0.6618
4.6	0.6628	0.6637	0.6646	0.6656	0.6665	0.6675	0.6684	0.6693	0.6702	0.6712
4.7	0.6721	0.6730	0.6739	0.6749	0.6758	0.6767	0.6776	0.6785	0.6794	0.6803
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
4.8	0.6812	0.6821	0.6830	0.6839	0.6848	0.6857	0.6866	0.6875	0.6884	0.6893
4.9	0.6902	0.6911	0.6920	0.6928	0.6937	0.6946	0.6955	0.6964	0.6972	0.6981
5.0	0.6990	0.6998	0.7007	0.7016	0.7024	0.7033	0.7042	0.7050	0.7059	0.7067
5.1	0.7076	0.7084	0.7093	0.7101	0.7110	0.7118	0.7126	0.7135	0.7143	0.7152
5.2	0.7160	0.7168	0.7177	0.7185	0.7193	0.7202	0.7210	0.7218	0.7226	0.7235
5.3	0.7243	0.7251	0.7259	0.7267	0.7275	0.7284	0.7292	0.7300	0.7308	0.7316
5.4	0.7324	0.7332	0.7340	0.7348	0.7356	0.7364	0.7372	0.7380	0.7388	0.7396
5.5	0.7404	0.7412	0.7419	0.7427	0.7435	0.7443	0.7451	0.7459	0.7466	0.7474
5.6	0.7482	0.7490	0.7497	0.7505	0.7513	0.7520	0.7528	0.7536	0.7543	0.7551
5.7	0.7559	0.7566	0.7574	0.7582	0.7589	0.7597	0.7604	0.7612	0.7619	0.7627
5.8	0.7634	0.7642	0.7649	0.7657	0.7664	0.7672	0.7679	0.7686	0.7694	0.7701
5.9	0.7709	0.7716	0.7723	0.7731	0.7738	0.7745	0.7752	0.7760	0.7767	0.7774
6.0	0.7782	0.7789	0.7796	0.7803	0.7810	0.7818	0.7825	0.7832	0.7839	0.7846
6.1	0.7853	0.7860	0.7868	0.7875	0.7882	0.7889	0.7896	0.7903	0.7910	0.7917
6.2	0.7924	0.7931	0.7938	0.7945	0.7952	0.7959	0.7966	0.7973	0.7980	0.7987
6.3	0.7993	0.8000	0.8007	0.8014	0.8021	0.8028	0.8035	0.8041	0.8048	0.8055
6.4	0.8062	0.8069	0.8075	0.8082	0.8089	0.8096	0.8102	0.8109	0.8116	0.8122
6.5	0.8129	0.8136	0.8142	0.8149	0.8156	0.8162	0.8169	0.8176	0.8182	0.8189
6.6	0.8195	0.8202	0.8209	0.8215	0.8222	0.8228	0.8235	0.8241	0.8248	0.8254
6.7	0.8261	0.8267	0.8274	0.8280	0.8287	0.8293	0.8299	0.8306	0.8312	0.8319
6.8	0.8325	0.8331	0.8338	0.8344	0.8351	0.8357	0.8363	0.8370	0.8376	0.8382
6.9	0.8388	0.8395	0.8401	0.8407	0.8414	0.8420	0.8426	0.8432	0.8439	0.8445
7.0	0.8451	0.8457	0.8463	0.8470	0.8476	0.8482	0.8488	0.8494	0.8500	0.8506
7.1	0.8513	0.8519	0.8525	0.8531	0.8537	0.8543	0.8549	0.8555	0.8561	0.8567
7.2	0.8573	0.8579	0.8585	0.8591	0.8597	0.8603	0.8609	0.8615	0.8621	0.8627
7.3	0.8633	0.8639	0.8645	0.8651	0.8657	0.8663	0.8669	0.8675	0.8681	0.8686
7.4	0.8692	0.8698	0.8704	0.8710	0.8716	0.8722	0.8727	0.8733	0.8739	0.8745
7.5	0.8751	0.8756	0.8762	0.8768	0.8774	0.8779	0.8785	0.8791	0.8797	0.8802
7.6	0.8808	0.8814	0.8820	0.8825	0.8831	0.8837	0.8842	0.8848	0.8854	0.8859
7.7	0.8865	0.8871	0.8876	0.8882	0.8887	0.8893	0.8899	0.8904	0.8910	0.8915
7.8	0.8921	0.8927	0.8932	0.8938	0.8943	0.8949	0.8954	0.8960	0.8965	0.8971
7.9	0.8976	0.8982	0.8987	0.8993	0.8998	0.9004	0.9009	0.9015	0.9020	0.9025
8.0	0.9031	0.9036	0.9042	0.9047	0.9053	0.9058	0.9063	0.9069	0.9074	0.9079
8.1	0.9085	0.9090	0.9096	0.9101	0.9106	0.9112	0.9117	0.9122	0.9128	0.9133
8.2	0.9138	0.9143	0.9149	0.9154	0.9159	0.9165	0.9170	0.9175	0.9180	0.9186
8.3	0.9191	0.9196	0.9201	0.9206	0.9212	0.9217	0.9222	0.9227	0.9232	0.9238
8.4	0.9243	0.9248	0.9253	0.9258	0.9263	0.9269	0.9274	0.9279	0.9284	0.9289
8.5	0.9294	0.9299	0.9304	0.9309	0.9315	0.9320	0.9325	0.9330	0.9335	0.9340
8.6	0.9345	0.9350	0.9355	0.9360	0.9365	0.9370	0.9375	0.9380	0.9385	0.9390
8.7	0.9395	0.9400	0.9405	0.9410	0.9415	0.9420	0.9425	0.9430	0.9435	0.9440
8.8	0.9445	0.9450	0.9455	0.9460	0.9465	0.9469	0.9474	0.9479	0.9484	0.9489
8.9	0.9494	0.9499	0.9504	0.9509	0.9513	0.9518	0.9523	0.9528	0.9533	0.9538
9.0	0.9542	0.9547	0.9552	0.9557	0.9562	0.9566	0.9571	0.9576	0.9581	0.9586
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
9.1	0.9590	0.9595	0.9600	0.9605	0.9609	0.9614	0.9619	0.9624	0.9628	0.9633
9.2	0.9638	0.9643	0.9647	0.9652	0.9657	0.9661	0.9666	0.9671	0.9675	0.9680
9.3	0.9685	0.9689	0.9694	0.9699	0.9703	0.9708	0.9713	0.9717	0.9722	0.9727
9.4	0.9731	0.9736	0.9741	0.9745	0.9750	0.9754	0.9759	0.9763	0.9768	0.9773
9.5	0.9777	0.9782	0.9786	0.9791	0.9795	0.9800	0.9805	0.9809	0.9814	0.9818
9.6	0.9823	0.9827	0.9832	0.9836	0.9841	0.9845	0.9850	0.9854	0.9859	0.9863
9.7	0.9868	0.9872	0.9877	0.9881	0.9886	0.9890	0.9894	0.9899	0.9903	0.9908
9.8	0.9912	0.9917	0.9921	0.9926	0.9930	0.9934	0.9939	0.9943	0.9948	0.9952
9.9	0.9956	0.9961	0.9965	0.9969	0.9974	0.9978	0.9983	0.9987	0.9991	0.9996
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

Natural Logarithms

The natural logarithm of 3.14 is found by going down to the row 3.1, then over to the column 0.04, to find 1.1442.

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.0	0.0000	0.0100	0.0198	0.0296	0.0392	0.0488	0.0583	0.0677	0.0770	0.0862
1.1	0.0953	0.1044	0.1133	0.1222	0.1310	0.1398	0.1484	0.1570	0.1655	0.1740
1.2	0.1823	0.1906	0.1989	0.2070	0.2151	0.2231	0.2311	0.2390	0.2469	0.2546
1.3	0.2624	0.2700	0.2776	0.2852	0.2927	0.3001	0.3075	0.3148	0.3221	0.3293
1.4	0.3365	0.3436	0.3507	0.3577	0.3646	0.3716	0.3784	0.3853	0.3920	0.3988
1.5	0.4055	0.4121	0.4187	0.4253	0.4318	0.4383	0.4447	0.4511	0.4574	0.4637
1.6	0.4700	0.4762	0.4824	0.4886	0.4947	0.5008	0.5068	0.5128	0.5188	0.5247
1.7	0.5306	0.5365	0.5423	0.5481	0.5539	0.5596	0.5653	0.5710	0.5766	0.5822
1.8	0.5878	0.5933	0.5988	0.6043	0.6098	0.6152	0.6206	0.6259	0.6313	0.6366
1.9	0.6419	0.6471	0.6523	0.6575	0.6627	0.6678	0.6729	0.6780	0.6831	0.6881
2.0	0.6931	0.6981	0.7031	0.7080	0.7129	0.7178	0.7227	0.7275	0.7324	0.7372
2.1	0.7419	0.7467	0.7514	0.7561	0.7608	0.7655	0.7701	0.7747	0.7793	0.7839
2.2	0.7885	0.7930	0.7975	0.8020	0.8065	0.8109	0.8154	0.8198	0.8242	0.8286
2.3	0.8329	0.8372	0.8416	0.8459	0.8502	0.8544	0.8587	0.8629	0.8671	0.8713
2.4	0.8755	0.8796	0.8838	0.8879	0.8920	0.8961	0.9002	0.9042	0.9083	0.9123
2.5	0.9163	0.9203	0.9243	0.9282	0.9322	0.9361	0.9400	0.9439	0.9478	0.9517
2.6	0.9555	0.9594	0.9632	0.9670	0.9708	0.9746	0.9783	0.9821	0.9858	0.9895
2.7	0.9933	0.9969	1.0006	1.0043	1.0080	1.0116	1.0152	1.0188	1.0225	1.0260
2.8	1.0296	1.0332	1.0367	1.0403	1.0438	1.0473	1.0508	1.0543	1.0578	1.0613
2.9	1.0647	1.0682	1.0716	1.0750	1.0784	1.0818	1.0852	1.0886	1.0919	1.0953
3.0	1.0986	1.1019	1.1053	1.1086	1.1119	1.1151	1.1184	1.1217	1.1249	1.1282
3.1	1.1314	1.1346	1.1378	1.1410	1.1442	1.1474	1.1506	1.1537	1.1569	1.1600
3.2	1.1632	1.1663	1.1694	1.1725	1.1756	1.1787	1.1817	1.1848	1.1878	1.1909
3.3	1.1939	1.1969	1.2000	1.2030	1.2060	1.2090	1.2119	1.2149	1.2179	1.2208
3.4	1.2238	1.2267	1.2296	1.2326	1.2355	1.2384	1.2413	1.2442	1.2470	1.2499
3.5	1.2528	1.2556	1.2585	1.2613	1.2641	1.2669	1.2698	1.2726	1.2754	1.2782
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
3.6	1.2809	1.2837	1.2865	1.2892	1.2920	1.2947	1.2975	1.3002	1.3029	1.3056
3.7	1.3083	1.3110	1.3137	1.3164	1.3191	1.3218	1.3244	1.3271	1.3297	1.3324
3.8	1.3350	1.3376	1.3403	1.3429	1.3455	1.3481	1.3507	1.3533	1.3558	1.3584
3.9	1.3610	1.3635	1.3661	1.3686	1.3712	1.3737	1.3762	1.3788	1.3813	1.3838
4.0	1.3863	1.3888	1.3913	1.3938	1.3962	1.3987	1.4012	1.4036	1.4061	1.4085
4.1	1.4110	1.4134	1.4159	1.4183	1.4207	1.4231	1.4255	1.4279	1.4303	1.4327
4.2	1.4351	1.4375	1.4398	1.4422	1.4446	1.4469	1.4493	1.4516	1.4540	1.4563
4.3	1.4586	1.4609	1.4633	1.4656	1.4679	1.4702	1.4725	1.4748	1.4770	1.4793
4.4	1.4816	1.4839	1.4861	1.4884	1.4907	1.4929	1.4951	1.4974	1.4996	1.5019
4.5	1.5041	1.5063	1.5085	1.5107	1.5129	1.5151	1.5173	1.5195	1.5217	1.5239
4.6	1.5261	1.5282	1.5304	1.5326	1.5347	1.5369	1.5390	1.5412	1.5433	1.5454
4.7	1.5476	1.5497	1.5518	1.5539	1.5560	1.5581	1.5602	1.5623	1.5644	1.5665
4.8	1.5686	1.5707	1.5728	1.5748	1.5769	1.5790	1.5810	1.5831	1.5851	1.5872
4.9	1.5892	1.5913	1.5933	1.5953	1.5974	1.5994	1.6014	1.6034	1.6054	1.6074
5.0	1.6094	1.6114	1.6134	1.6154	1.6174	1.6194	1.6214	1.6233	1.6253	1.6273
5.1	1.6292	1.6312	1.6332	1.6351	1.6371	1.6390	1.6409	1.6429	1.6448	1.6467
5.2	1.6487	1.6506	1.6525	1.6544	1.6563	1.6582	1.6601	1.6620	1.6639	1.6658
5.3	1.6677	1.6696	1.6715	1.6734	1.6752	1.6771	1.6790	1.6808	1.6827	1.6845
5.4	1.6864	1.6882	1.6901	1.6919	1.6938	1.6956	1.6974	1.6993	1.7011	1.7029
5.5	1.7047	1.7066	1.7084	1.7102	1.7120	1.7138	1.7156	1.7174	1.7192	1.7210
5.6	1.7228	1.7246	1.7263	1.7281	1.7299	1.7317	1.7334	1.7352	1.7370	1.7387
5.7	1.7405	1.7422	1.7440	1.7457	1.7475	1.7492	1.7509	1.7527	1.7544	1.7561
5.8	1.7579	1.7596	1.7613	1.7630	1.7647	1.7664	1.7681	1.7699	1.7716	1.7733
5.9	1.7750	1.7766	1.7783	1.7800	1.7817	1.7834	1.7851	1.7867	1.7884	1.7901
6.0	1.7918	1.7934	1.7951	1.7967	1.7984	1.8001	1.8017	1.8034	1.8050	1.8066
6.1	1.8083	1.8099	1.8116	1.8132	1.8148	1.8165	1.8181	1.8197	1.8213	1.8229
6.2	1.8245	1.8262	1.8278	1.8294	1.8310	1.8326	1.8342	1.8358	1.8374	1.8390
6.3	1.8405	1.8421	1.8437	1.8453	1.8469	1.8485	1.8500	1.8516	1.8532	1.8547
6.4	1.8563	1.8579	1.8594	1.8610	1.8625	1.8641	1.8656	1.8672	1.8687	1.8703
6.5	1.8718	1.8733	1.8749	1.8764	1.8779	1.8795	1.8810	1.8825	1.8840	1.8856
6.6	1.8871	1.8886	1.8901	1.8916	1.8931	1.8946	1.8961	1.8976	1.8991	1.9006
6.7	1.9021	1.9036	1.9051	1.9066	1.9081	1.9095	1.9110	1.9125	1.9140	1.9155
6.8	1.9169	1.9184	1.9199	1.9213	1.9228	1.9242	1.9257	1.9272	1.9286	1.9301
6.9	1.9315	1.9330	1.9344	1.9359	1.9373	1.9387	1.9402	1.9416	1.9430	1.9445
7.0	1.9459	1.9473	1.9488	1.9502	1.9516	1.9530	1.9544	1.9559	1.9573	1.9587
7.1	1.9601	1.9615	1.9629	1.9643	1.9657	1.9671	1.9685	1.9699	1.9713	1.9727
7.2	1.9741	1.9755	1.9769	1.9782	1.9796	1.9810	1.9824	1.9838	1.9851	1.9865
7.3	1.9879	1.9892	1.9906	1.9920	1.9933	1.9947	1.9961	1.9974	1.9988	2.0001
7.4	2.0015	2.0028	2.0042	2.0055	2.0069	2.0082	2.0096	2.0109	2.0122	2.0136
7.5	2.0149	2.0162	2.0176	2.0189	2.0202	2.0215	2.0229	2.0242	2.0255	2.0268
7.6	2.0281	2.0295	2.0308	2.0321	2.0334	2.0347	2.0360	2.0373	2.0386	2.0399
7.7	2.0412	2.0425	2.0438	2.0451	2.0464	2.0477	2.0490	2.0503	2.0516	2.0528
7.8	2.0541	2.0554	2.0567	2.0580	2.0592	2.0605	2.0618	2.0631	2.0643	2.0656
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
7.9	2.0669	2.0681	2.0694	2.0707	2.0719	2.0732	2.0744	2.0757	2.0769	2.0782
8.0	2.0794	2.0807	2.0819	2.0832	2.0844	2.0857	2.0869	2.0882	2.0894	2.0906
8.1	2.0919	2.0931	2.0943	2.0956	2.0968	2.0980	2.0992	2.1005	2.1017	2.1029
8.2	2.1041	2.1054	2.1066	2.1078	2.1090	2.1102	2.1114	2.1126	2.1138	2.1150
8.3	2.1163	2.1175	2.1187	2.1199	2.1211	2.1223	2.1235	2.1247	2.1258	2.1270
8.4	2.1282	2.1294	2.1306	2.1318	2.1330	2.1342	2.1353	2.1365	2.1377	2.1389
8.5	2.1401	2.1412	2.1424	2.1436	2.1448	2.1459	2.1471	2.1483	2.1494	2.1506
8.6	2.1518	2.1529	2.1541	2.1552	2.1564	2.1576	2.1587	2.1599	2.1610	2.1622
8.7	2.1633	2.1645	2.1656	2.1668	2.1679	2.1691	2.1702	2.1713	2.1725	2.1736
8.8	2.1748	2.1759	2.1770	2.1782	2.1793	2.1804	2.1815	2.1827	2.1838	2.1849
8.9	2.1861	2.1872	2.1883	2.1894	2.1905	2.1917	2.1928	2.1939	2.1950	2.1961
9.0	2.1972	2.1983	2.1994	2.2006	2.2017	2.2028	2.2039	2.2050	2.2061	2.2072
9.1	2.2083	2.2094	2.2105	2.2116	2.2127	2.2138	2.2148	2.2159	2.2170	2.2181
9.2	2.2192	2.2203	2.2214	2.2225	2.2235	2.2246	2.2257	2.2268	2.2279	2.2289
9.3	2.2300	2.2311	2.2322	2.2332	2.2343	2.2354	2.2364	2.2375	2.2386	2.2396
9.4	2.2407	2.2418	2.2428	2.2439	2.2450	2.2460	2.2471	2.2481	2.2492	2.2502
9.5	2.2513	2.2523	2.2534	2.2544	2.2555	2.2565	2.2576	2.2586	2.2597	2.2607
9.6	2.2618	2.2628	2.2638	2.2649	2.2659	2.2670	2.2680	2.2690	2.2701	2.2711
9.7	2.2721	2.2732	2.2742	2.2752	2.2762	2.2773	2.2783	2.2793	2.2803	2.2814
9.8	2.2824	2.2834	2.2844	2.2854	2.2865	2.2875	2.2885	2.2895	2.2905	2.2915
9.9	2.2925	2.2935	2.2946	2.2956	2.2966	2.2976	2.2986	2.2996	2.3006	2.3016
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

Trigonometric Functions in Degrees

Angles in the leftmost column correspond to functions listed across the top. Angles in the rightmost column correspond to functions listed across the bottom. This "double-duty" is possible thanks to symmetries of the trig functions.

	cos	sin	tan	cot	sec	csc	
0.00°	1.0000	0.0000	0.0000	∞	1.0000	∞	90.00°
0.25°	1.0000	0.0044	0.0044	229.1817	1.0000	229.1838	89.75°
0.50°	1.0000	0.0087	0.0087	114.5887	1.0000	114.5930	89.50°
0.75°	0.9999	0.0131	0.0131	76.3900	1.0001	76.3966	89.25°
1.00°	0.9998	0.0175	0.0175	57.2900	1.0002	57.2987	89.00°
1.25°	0.9998	0.0218	0.0218	45.8294	1.0002	45.8403	88.75°
1.50°	0.9997	0.0262	0.0262	38.1885	1.0003	38.2016	88.50°
1.75°	0.9995	0.0305	0.0306	32.7303	1.0005	32.7455	88.25°
2.00°	0.9994	0.0349	0.0349	28.6363	1.0006	28.6537	88.00°
2.25°	0.9992	0.0393	0.0393	25.4517	1.0008	25.4713	87.75°
2.50°	0.9990	0.0436	0.0437	22.9038	1.0010	22.9256	87.50°
2.75°	0.9988	0.0480	0.0480	20.8188	1.0012	20.8428	87.25°
3.00°	0.9986	0.0523	0.0524	19.0811	1.0014	19.1073	87.00°
	sin	cos	cot	tan	csc	sec	

	cos	sin	tan	cot	sec	csc	
3.25°	0.9984	0.0567	0.0568	17.6106	1.0016	17.6389	86.75°
3.50°	0.9981	0.0610	0.0612	16.3499	1.0019	16.3804	86.50°
3.75°	0.9979	0.0654	0.0655	15.2571	1.0021	15.2898	86.25°
4.00°	0.9976	0.0698	0.0699	14.3007	1.0024	14.3356	86.00°
4.25°	0.9973	0.0741	0.0743	13.4566	1.0028	13.4937	85.75°
4.50°	0.9969	0.0785	0.0787	12.7062	1.0031	12.7455	85.50°
4.75°	0.9966	0.0828	0.0831	12.0346	1.0034	12.0761	85.25°
5.00°	0.9962	0.0872	0.0875	11.4301	1.0038	11.4737	85.00°
5.25°	0.9958	0.0915	0.0919	10.8829	1.0042	10.9288	84.75°
5.50°	0.9954	0.0958	0.0963	10.3854	1.0046	10.4334	84.50°
5.75°	0.9950	0.1002	0.1007	9.9310	1.0051	9.9812	84.25°
6.00°	0.9945	0.1045	0.1051	9.5144	1.0055	9.5668	84.00°
6.25°	0.9941	0.1089	0.1095	9.1309	1.0060	9.1855	83.75°
6.50°	0.9936	0.1132	0.1139	8.7769	1.0065	8.8337	83.50°
6.75°	0.9931	0.1175	0.1184	8.4490	1.0070	8.5079	83.25°
7.00°	0.9925	0.1219	0.1228	8.1443	1.0075	8.2055	83.00°
7.25°	0.9920	0.1262	0.1272	7.8606	1.0081	7.9240	82.75°
7.50°	0.9914	0.1305	0.1317	7.5958	1.0086	7.6613	82.50°
7.75°	0.9909	0.1349	0.1361	7.3479	1.0092	7.4156	82.25°
8.00°	0.9903	0.1392	0.1405	7.1154	1.0098	7.1853	82.00°
8.25°	0.9897	0.1435	0.1450	6.8969	1.0105	6.9690	81.75°
8.50°	0.9890	0.1478	0.1495	6.6912	1.0111	6.7655	81.50°
8.75°	0.9884	0.1521	0.1539	6.4971	1.0118	6.5736	81.25°
9.00°	0.9877	0.1564	0.1584	6.3138	1.0125	6.3925	81.00°
9.25°	0.9870	0.1607	0.1629	6.1402	1.0132	6.2211	80.75°
9.50°	0.9863	0.1650	0.1673	5.9758	1.0139	6.0589	80.50°
9.75°	0.9856	0.1693	0.1718	5.8197	1.0147	5.9049	80.25°
10.00°	0.9848	0.1736	0.1763	5.6713	1.0154	5.7588	80.00°
10.25°	0.9840	0.1779	0.1808	5.5301	1.0162	5.6198	79.75°
10.50°	0.9833	0.1822	0.1853	5.3955	1.0170	5.4874	79.50°
10.75°	0.9825	0.1865	0.1899	5.2672	1.0179	5.3612	79.25°
11.00°	0.9816	0.1908	0.1944	5.1446	1.0187	5.2408	79.00°
11.25°	0.9808	0.1951	0.1989	5.0273	1.0196	5.1258	78.75°
11.50°	0.9799	0.1994	0.2035	4.9152	1.0205	5.0159	78.50°
11.75°	0.9790	0.2036	0.2080	4.8077	1.0214	4.9106	78.25°
12.00°	0.9781	0.2079	0.2126	4.7046	1.0223	4.8097	78.00°
12.25°	0.9772	0.2122	0.2171	4.6057	1.0233	4.7130	77.75°
12.50°	0.9763	0.2164	0.2217	4.5107	1.0243	4.6202	77.50°
12.75°	0.9753	0.2207	0.2263	4.4194	1.0253	4.5311	77.25°
13.00°	0.9744	0.2250	0.2309	4.3315	1.0263	4.4454	77.00°
13.25°	0.9734	0.2292	0.2355	4.2468	1.0273	4.3630	76.75°
13.50°	0.9724	0.2334	0.2401	4.1653	1.0284	4.2837	76.50°
13.75°	0.9713	0.2377	0.2447	4.0867	1.0295	4.2072	76.25°
	sin	cos	cot	tan	csc	sec	

	cos	sin	tan	cot	sec	csc	
14.00°	0.9703	0.2419	0.2493	4.0108	1.0306	4.1336	76.00°
14.25°	0.9692	0.2462	0.2540	3.9375	1.0317	4.0625	75.75°
14.50°	0.9681	0.2504	0.2586	3.8667	1.0329	3.9939	75.50°
14.75°	0.9670	0.2546	0.2633	3.7983	1.0341	3.9277	75.25°
15.00°	0.9659	0.2588	0.2679	3.7321	1.0353	3.8637	75.00°
15.25°	0.9648	0.2630	0.2726	3.6680	1.0365	3.8018	74.75°
15.50°	0.9636	0.2672	0.2773	3.6059	1.0377	3.7420	74.50°
15.75°	0.9625	0.2714	0.2820	3.5457	1.0390	3.6840	74.25°
16.00°	0.9613	0.2756	0.2867	3.4874	1.0403	3.6280	74.00°
16.25°	0.9600	0.2798	0.2915	3.4308	1.0416	3.5736	73.75°
16.50°	0.9588	0.2840	0.2962	3.3759	1.0429	3.5209	73.50°
16.75°	0.9576	0.2882	0.3010	3.3226	1.0443	3.4699	73.25°
17.00°	0.9563	0.2924	0.3057	3.2709	1.0457	3.4203	73.00°
17.25°	0.9550	0.2965	0.3105	3.2205	1.0471	3.3722	72.75°
17.50°	0.9537	0.3007	0.3153	3.1716	1.0485	3.3255	72.50°
17.75°	0.9524	0.3049	0.3201	3.1240	1.0500	3.2801	72.25°
18.00°	0.9511	0.3090	0.3249	3.0777	1.0515	3.2361	72.00°
18.25°	0.9497	0.3132	0.3298	3.0326	1.0530	3.1932	71.75°
18.50°	0.9483	0.3173	0.3346	2.9887	1.0545	3.1515	71.50°
18.75°	0.9469	0.3214	0.3395	2.9459	1.0560	3.1110	71.25°
19.00°	0.9455	0.3256	0.3443	2.9042	1.0576	3.0716	71.00°
19.25°	0.9441	0.3297	0.3492	2.8636	1.0592	3.0331	70.75°
19.50°	0.9426	0.3338	0.3541	2.8239	1.0608	2.9957	70.50°
19.75°	0.9412	0.3379	0.3590	2.7852	1.0625	2.9593	70.25°
20.00°	0.9397	0.3420	0.3640	2.7475	1.0642	2.9238	70.00°
20.25°	0.9382	0.3461	0.3689	2.7106	1.0659	2.8892	69.75°
20.50°	0.9367	0.3502	0.3739	2.6746	1.0676	2.8555	69.50°
20.75°	0.9351	0.3543	0.3789	2.6395	1.0694	2.8225	69.25°
21.00°	0.9336	0.3584	0.3839	2.6051	1.0711	2.7904	69.00°
21.25°	0.9320	0.3624	0.3889	2.5715	1.0730	2.7591	68.75°
21.50°	0.9304	0.3665	0.3939	2.5386	1.0748	2.7285	68.50°
21.75°	0.9288	0.3706	0.3990	2.5065	1.0766	2.6986	68.25°
22.00°	0.9272	0.3746	0.4040	2.4751	1.0785	2.6695	68.00°
22.25°	0.9255	0.3786	0.4091	2.4443	1.0804	2.6410	67.75°
22.50°	0.9239	0.3827	0.4142	2.4142	1.0824	2.6131	67.50°
22.75°	0.9222	0.3867	0.4193	2.3847	1.0844	2.5859	67.25°
23.00°	0.9205	0.3907	0.4245	2.3559	1.0864	2.5593	67.00°
23.25°	0.9188	0.3947	0.4296	2.3276	1.0884	2.5333	66.75°
23.50°	0.9171	0.3987	0.4348	2.2998	1.0904	2.5078	66.50°
23.75°	0.9153	0.4027	0.4400	2.2727	1.0925	2.4830	66.25°
24.00°	0.9135	0.4067	0.4452	2.2460	1.0946	2.4586	66.00°
24.25°	0.9118	0.4107	0.4505	2.2199	1.0968	2.4348	65.75°
24.50°	0.9100	0.4147	0.4557	2.1943	1.0989	2.4114	65.50°
	sin	cos	cot	tan	csc	sec	

	cos	sin	tan	cot	sec	csc	
24.75°	0.9081	0.4187	0.4610	2.1692	1.1011	2.3886	65.25°
25.00°	0.9063	0.4226	0.4663	2.1445	1.1034	2.3662	65.00°
25.25°	0.9045	0.4266	0.4716	2.1203	1.1056	2.3443	64.75°
25.50°	0.9026	0.4305	0.4770	2.0965	1.1079	2.3228	64.50°
25.75°	0.9007	0.4344	0.4823	2.0732	1.1102	2.3018	64.25°
26.00°	0.8988	0.4384	0.4877	2.0503	1.1126	2.2812	64.00°
26.25°	0.8969	0.4423	0.4931	2.0278	1.1150	2.2610	63.75°
26.50°	0.8949	0.4462	0.4986	2.0057	1.1174	2.2412	63.50°
26.75°	0.8930	0.4501	0.5040	1.9840	1.1198	2.2217	63.25°
27.00°	0.8910	0.4540	0.5095	1.9626	1.1223	2.2027	63.00°
27.25°	0.8890	0.4579	0.5150	1.9416	1.1248	2.1840	62.75°
27.50°	0.8870	0.4617	0.5206	1.9210	1.1274	2.1657	62.50°
27.75°	0.8850	0.4656	0.5261	1.9007	1.1300	2.1477	62.25°
28.00°	0.8829	0.4695	0.5317	1.8807	1.1326	2.1301	62.00°
28.25°	0.8809	0.4733	0.5373	1.8611	1.1352	2.1127	61.75°
28.50°	0.8788	0.4772	0.5430	1.8418	1.1379	2.0957	61.50°
28.75°	0.8767	0.4810	0.5486	1.8228	1.1406	2.0791	61.25°
29.00°	0.8746	0.4848	0.5543	1.8040	1.1434	2.0627	61.00°
29.25°	0.8725	0.4886	0.5600	1.7856	1.1461	2.0466	60.75°
29.50°	0.8704	0.4924	0.5658	1.7675	1.1490	2.0308	60.50°
29.75°	0.8682	0.4962	0.5715	1.7496	1.1518	2.0152	60.25°
30.00°	0.8660	0.5000	0.5774	1.7321	1.1547	2.0000	60.00°
30.25°	0.8638	0.5038	0.5832	1.7147	1.1576	1.9850	59.75°
30.50°	0.8616	0.5075	0.5890	1.6977	1.1606	1.9703	59.50°
30.75°	0.8594	0.5113	0.5949	1.6808	1.1636	1.9558	59.25°
31.00°	0.8572	0.5150	0.6009	1.6643	1.1666	1.9416	59.00°
31.25°	0.8549	0.5188	0.6068	1.6479	1.1697	1.9276	58.75°
31.50°	0.8526	0.5225	0.6128	1.6319	1.1728	1.9139	58.50°
31.75°	0.8504	0.5262	0.6188	1.6160	1.1760	1.9004	58.25°
32.00°	0.8480	0.5299	0.6249	1.6003	1.1792	1.8871	58.00°
32.25°	0.8457	0.5336	0.6310	1.5849	1.1824	1.8740	57.75°
32.50°	0.8434	0.5373	0.6371	1.5697	1.1857	1.8612	57.50°
32.75°	0.8410	0.5410	0.6432	1.5547	1.1890	1.8485	57.25°
33.00°	0.8387	0.5446	0.6494	1.5399	1.1924	1.8361	57.00°
33.25°	0.8363	0.5483	0.6556	1.5253	1.1958	1.8238	56.75°
33.50°	0.8339	0.5519	0.6619	1.5108	1.1992	1.8118	56.50°
33.75°	0.8315	0.5556	0.6682	1.4966	1.2027	1.8000	56.25°
34.00°	0.8290	0.5592	0.6745	1.4826	1.2062	1.7883	56.00°
34.25°	0.8266	0.5628	0.6809	1.4687	1.2098	1.7768	55.75°
34.50°	0.8241	0.5664	0.6873	1.4550	1.2134	1.7655	55.50°
34.75°	0.8216	0.5700	0.6937	1.4415	1.2171	1.7544	55.25°
35.00°	0.8192	0.5736	0.7002	1.4281	1.2208	1.7434	55.00°
35.25°	0.8166	0.5771	0.7067	1.4150	1.2245	1.7327	54.75°
	sin	cos	cot	tan	csc	sec	

	cos	sin	tan	cot	sec	csc	
35.50°	0.8141	0.5807	0.7133	1.4019	1.2283	1.7221	54.50°
35.75°	0.8116	0.5842	0.7199	1.3891	1.2322	1.7116	54.25°
36.00°	0.8090	0.5878	0.7265	1.3764	1.2361	1.7013	54.00°
36.25°	0.8064	0.5913	0.7332	1.3638	1.2400	1.6912	53.75°
36.50°	0.8039	0.5948	0.7400	1.3514	1.2440	1.6812	53.50°
36.75°	0.8013	0.5983	0.7467	1.3392	1.2480	1.6713	53.25°
37.00°	0.7986	0.6018	0.7536	1.3270	1.2521	1.6616	53.00°
37.25°	0.7960	0.6053	0.7604	1.3151	1.2563	1.6521	52.75°
37.50°	0.7934	0.6088	0.7673	1.3032	1.2605	1.6427	52.50°
37.75°	0.7907	0.6122	0.7743	1.2915	1.2647	1.6334	52.25°
38.00°	0.7880	0.6157	0.7813	1.2799	1.2690	1.6243	52.00°
38.25°	0.7853	0.6191	0.7883	1.2685	1.2734	1.6153	51.75°
38.50°	0.7826	0.6225	0.7954	1.2572	1.2778	1.6064	51.50°
38.75°	0.7799	0.6259	0.8026	1.2460	1.2822	1.5976	51.25°
39.00°	0.7771	0.6293	0.8098	1.2349	1.2868	1.5890	51.00°
39.25°	0.7744	0.6327	0.8170	1.2239	1.2913	1.5805	50.75°
39.50°	0.7716	0.6361	0.8243	1.2131	1.2960	1.5721	50.50°
39.75°	0.7688	0.6394	0.8317	1.2024	1.3007	1.5639	50.25°
40.00°	0.7660	0.6428	0.8391	1.1918	1.3054	1.5557	50.00°
40.25°	0.7632	0.6461	0.8466	1.1812	1.3102	1.5477	49.75°
40.50°	0.7604	0.6494	0.8541	1.1708	1.3151	1.5398	49.50°
40.75°	0.7576	0.6528	0.8617	1.1606	1.3200	1.5320	49.25°
41.00°	0.7547	0.6561	0.8693	1.1504	1.3250	1.5243	49.00°
41.25°	0.7518	0.6593	0.8770	1.1403	1.3301	1.5167	48.75°
41.50°	0.7490	0.6626	0.8847	1.1303	1.3352	1.5092	48.50°
41.75°	0.7461	0.6659	0.8925	1.1204	1.3404	1.5018	48.25°
42.00°	0.7431	0.6691	0.9004	1.1106	1.3456	1.4945	48.00°
42.25°	0.7402	0.6724	0.9083	1.1009	1.3510	1.4873	47.75°
42.50°	0.7373	0.6756	0.9163	1.0913	1.3563	1.4802	47.50°
42.75°	0.7343	0.6788	0.9244	1.0818	1.3618	1.4732	47.25°
43.00°	0.7314	0.6820	0.9325	1.0724	1.3673	1.4663	47.00°
43.25°	0.7284	0.6852	0.9407	1.0630	1.3729	1.4595	46.75°
43.50°	0.7254	0.6884	0.9490	1.0538	1.3786	1.4527	46.50°
43.75°	0.7224	0.6915	0.9573	1.0446	1.3843	1.4461	46.25°
44.00°	0.7193	0.6947	0.9657	1.0355	1.3902	1.4396	46.00°
44.25°	0.7163	0.6978	0.9742	1.0265	1.3961	1.4331	45.75°
44.50°	0.7133	0.7009	0.9827	1.0176	1.4020	1.4267	45.50°
44.75°	0.7102	0.7040	0.9913	1.0088	1.4081	1.4204	45.25°
45.00°	0.7071	0.7071	1.0000	1.0000	1.4142	1.4142	45.00°
	sin	cos	cot	tan	csc	sec	