Areas Under the Standard Normal Density

Tabled are the areas under the $N(0,1)$ density curve below z. This represents the proportion of a $N(0,1)$ population which takes on values less than or equal to z. The tabled value is illustrated by the shaded region in Figure 1.

As examples, the proportion of a $N(0,1)$ population which takes on values less than or equal to -1.83 is .0336, and the proportion of a $N(0,1)$ population which takes on values less than or equal to 2.38 is .9913.

By reading the table in reverse, the value z_p, below which lies a proportion p of a $N(0,1)$ population may be found. For example, to find the value $z_{.25}$, the point below which lies proportion .25 (or 1/4) of a $N(0,1)$ population, look in the body of the table to find values as close to .25 as possible. The two values are .2514, corresponding to $z = -.67$, and .2483, corresponding to $z = -.68$. Therefore, $z_{.25}$ lies between $-.67$ and $-.68$. As a second example, $z_{.84}$ lies between .99 and 1.00.

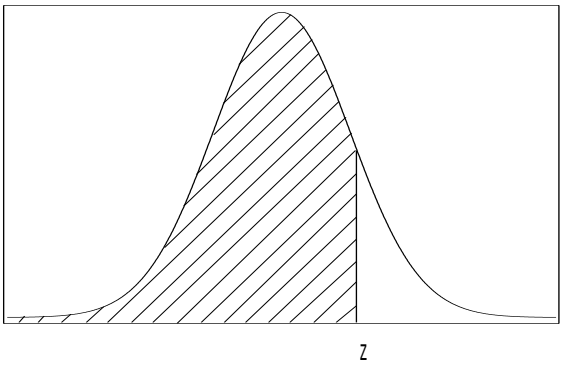

Figure 1: $N(0,1)$ *Curve: Shaded Area is Tabled*

	$N(0,1)$ Probabilities									
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.6	.0002	.0002	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0014	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0227	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0238	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1094	.1075	.1057	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1563	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1921	.1894	.1867
-0.7	.2420	.2388	.2358	.2327	.2297	.2266	.2236	.2207	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2482	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.0	.5000	.4960	.4920	.4880	.4841	.4801	.4761	.4721	.4681	.4641

	$N(0,1)$ Probabilities									
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7258	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7612	.7642	.7673	.7703	.7734	.7764	.7793	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8079	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8906	.8925	.8943	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9430	.9441
1.6	.9452	.9463	.9474	.9485	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9700	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9865	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9924	.9927	.9929	.9930	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9980	.9980	.9981
2.9	.9981	.9982	.9983	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999

Critical Values of the t Distribution

The critical value $t_{k,q}$ is the value below which lies an area q under the density curve of the t distribution with k degrees of freedom. That is, quantile q of the t_k distribution. Tabled are these critical values $t_{k,q}$ for selected degrees of freedom k and quantiles q. This is shown graphically in Figure 2, in which the curve represents a t_k density curve. The critical value $t_{k,q}$ is the value t in the figure for which the shaded area equals q.

Note that a t distribution with degrees of freedom ∞ is a $N(0,1)$ distribution.

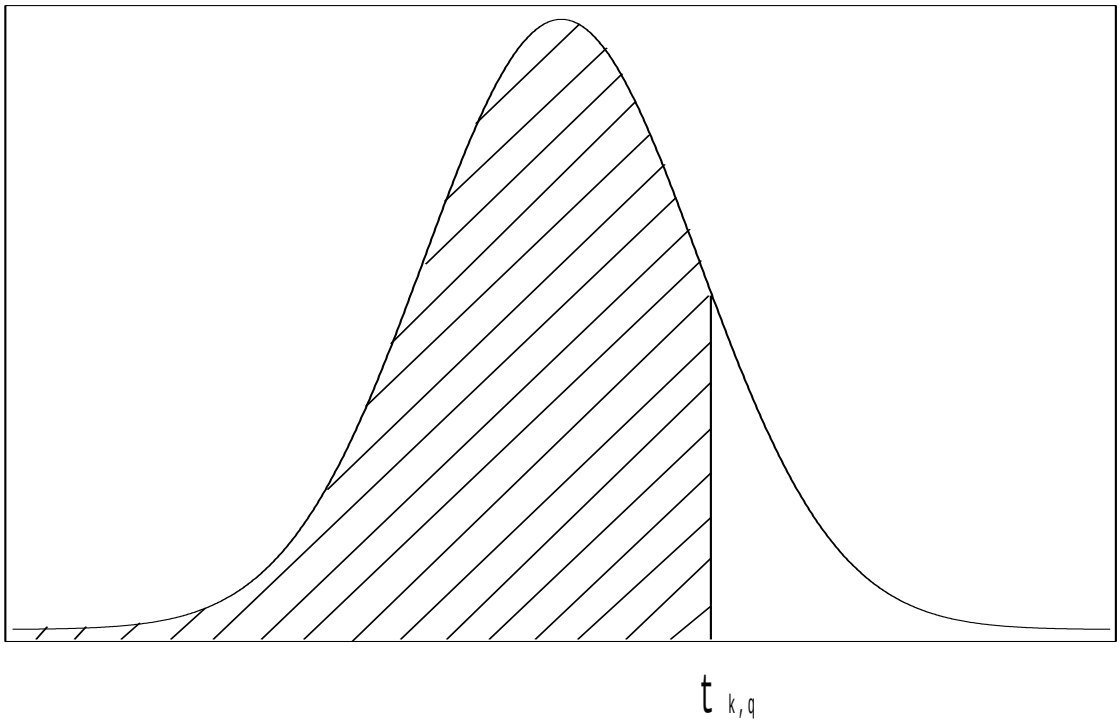

Figure 2: *t_k Curve: Shaded Area is q; $t_{k,q}$ is Tabled*

	Critical Values of the t Distribution						
Degrees of Freedom, k	$t_{k,.90}$	$t_{k,.95}$	$t_{k,.975}$	$t_{k,.99}$	$t_{k,.995}$	$t_{k,.999}$	$t_{k,.9995}$
1	3.0777	6.3137	12.7062	31.8205	63.6567	318.3090	636.6190
2	1.8856	2.9200	4.3027	6.9646	9.9248	22.3270	31.5990
3	1.6377	2.3534	3.1824	4.5407	5.8409	10.2150	12.9240
4	1.5332	2.1319	2.7764	3.7469	4.6041	7.1730	8.6100
5	1.4759	2.0150	2.5706	3.3649	4.0321	5.8930	6.8690
6	1.4398	1.9432	2.4469	3.1427	3.7074	5.2080	5.9590
7	1.4149	1.8946	2.3646	2.9980	3.4995	4.7850	5.4080
8	1.3968	1.8595	2.3060	2.8965	3.3554	4.5010	5.0410
9	1.3830	1.8331	2.2622	2.8214	3.2498	4.2970	4.7810
10	1.3722	1.8125	2.2281	2.7638	3.1693	4.1440	4.5870
11	1.3634	1.7959	2.2010	2.7181	3.1058	4.0250	4.4370
12	1.3562	1.7823	2.1788	2.6810	3.0545	3.9300	4.3180
13	1.3502	1.7709	2.1604	2.6503	3.0123	3.8520	4.2210
14	1.3450	1.7613	2.1448	2.6245	2.9768	3.7870	4.1400
15	1.3406	1.7530	2.1314	2.6025	2.9467	3.7330	4.0730
16	1.3368	1.7459	2.1199	2.5835	2.9208	3.6860	4.0150
17	1.3334	1.7396	2.1098	2.5669	2.8982	3.6460	3.9650
18	1.3304	1.7341	2.1009	2.5524	2.8784	3.6100	3.9220
19	1.3277	1.7291	2.0930	2.5395	2.8609	3.5790	3.8830
20	1.3253	1.7247	2.0860	2.5280	2.8453	3.5520	3.8500
21	1.3232	1.7207	2.0796	2.5176	2.8314	3.5270	3.8190
22	1.3212	1.7171	2.0739	2.5083	2.8188	3.5050	3.7920
23	1.3195	1.7139	2.0687	2.4999	2.8073	3.4850	3.7680
24	1.3178	1.7109	2.0639	2.4922	2.7969	3.4670	3.7450
25	1.3163	1.7081	2.0595	2.4851	2.7874	3.4500	3.7250
26	1.3150	1.7056	2.0555	2.4786	2.7787	3.4350	3.7066
27	1.3137	1.7033	2.0518	2.4727	2.7707	3.4210	3.6896
28	1.3125	1.7011	2.0484	2.4671	2.7633	3.4082	3.6739
29	1.3114	1.6991	2.0452	2.4620	2.7564	3.3962	3.6594
30	1.3104	1.6973	2.0423	2.4573	2.7500	3.3852	3.6460
35	1.3062	1.6896	2.0301	2.4377	2.7238	3.3400	3.5912
40	1.3031	1.6839	2.0211	2.4233	2.7045	3.3069	3.5510
50	1.2987	1.6759	2.0086	2.4033	2.6778	3.2614	3.4960
60	1.2958	1.6707	2.0003	2.3901	2.6603	3.2317	3.4602
70	1.2938	1.6669	1.9944	2.3808	2.6479	3.2108	3.4350
80	1.2922	1.6641	1.9901	2.3739	2.6387	3.1953	3.4163
90	1.2910	1.6620	1.9867	2.3685	2.6316	3.1833	3.4019
100	1.2901	1.6602	1.9840	2.3642	2.6259	3.1737	3.3905
∞	1.2816	1.6449	1.9600	2.3263	2.5758	3.0902	3.2905

Table of Constants for Normal-Theory Tolerance Intervals

	L=.90			L=.95			L=.99		
n	$\gamma = .90$	$\gamma = .95$	$\gamma = .99$	$\gamma = .90$	$\gamma = .95$	$\gamma = .99$	$\gamma = .90$	$\gamma = .95$	$\gamma = .99$
2	15.980	18.800	24.170	32.020	37.670	48.430	160.200	188.500	242.300
3	5.847	6.919	8.974	8.380	9.916	12.860	18.930	22.400	29.060
4	4.166	4.943	6.440	5.369	6.370	8.299	9.398	11.10	14.530
5	3.494	4.152	5.423	4.275	5.079	6.634	6.612	7.855	10.260
6	3.131	3.723	4.870	3.712	4.414	5.775	5.337	6.345	8.301
7	2.902	3.452	4.521	3.369	4.007	5.248	4.613	5.448	7.187
8	2.743	3.264	4.278	3.136	3.732	4.891	4.147	4.936	6.468
9	2.626	3.125	4.098	2.967	3.532	4.631	3.822	4.550	5.966
10	2.535	3.018	3.959	2.829	3.379	4.433	3.582	4.265	5.594
11	2.463	2.933	3.849	2.737	3.259	4.277	3.397	4.045	5.308
12	2.404	2.863	3.758	2.655	3.162	4.150	3.250	3.870	5.079
13	2.355	2.805	3.682	2.587	3.081	4.044	3.130	3.727	4.893
14	2.314	2.756	3.618	2.529	3.012	3.955	3.029	3.608	4.737
15	2.278	2.713	3.562	2.480	2.954	3.878	2.945	3.507	4.605
16	2.246	2.676	3.514	2.437	2.903	3.812	2.872	3.421	4.492
17	2.219	2.643	3.471	2.400	2.858	3.754	2.808	3.345	4.393
18	2.194	2.614	3.433	2.366	2.819	3.702	2.753	3.279	4.307
19	2.172	2.588	3.399	2.337	2.784	3.656	2.703	3.221	4.230
20	2.152	2.564	3.368	2.310	2.752	3.615	2.659	3.168	4.161
21	2.135	2.543	3.340	2.286	2.723	3.577	2.620	3.121	4.100
22	2.118	2.524	3.315	2.264	2.697	3.543	2.584	1.078	4.044
23	2.103	2.506	3.292	2.244	2.673	3.512	2.551	3.040	3.993
24	2.089	2.489	3.270	2.225	2.651	3.483	2.522	3.004	3.947
25	2.077	2.474	3.251	2.208	2.631	3.457	2.494	2.972	3.904
26	2.065	2.460	3.232	2.193	2.612	3.432	2.469	2.941	3.865
27	2.054	2.447	3.215	2.178	2.595	3.409	2.446	2.914	3.828
28	2.044	2.435	3.199	2.164	2.579	3.388	2.424	2.888	3.794
29	2.034	2.424	3.184	2.152	2.554	3.368	2.404	2.864	3.763
30	2.025	2.413	3.170	2.140	2.549	3.350	2.385	2.841	3.733
35	1.988	2.368	3.112	2.090	2.490	3.272	2.306	2.748	3.611
40	1.959	2.334	3.066	2.052	2.445	3.213	2.247	2.677	3.518
50	1.916	2.284	3.001	1.996	2.379	3.126	2.162	2.576	3.385
60	1.887	2.248	2.955	1.958	2.333	3.066	2.103	2.506	3.293
80	1.848	2.202	2.894	1.907	2.272	2.986	2.026	2.414	3.173
100	1.822	2.172	2.854	1.874	2.233	2.934	1.977	2.355	3.096
200	1.764	2.102	2.762	1.798	2.143	2.816	1.865	2.222	2.921
500	1.717	2.046	2.689	1.737	2.070	2.721	1.777	2.117	2.783
1000	1.695	2.019	2.654	1.709	2.036	2.676	1.736	2.068	2.718
∞	1.645	1.960	2.576	1.645	1.960	2.576	1.645	1.960	2.576