

Table A1 Numerical values of the standard normal distribution.

z	$F(z)$	$F^*(z)$	z	$F(z)$	$F^*(z)$	z	$F(z)$	$F^*(z)$
0	0.5	0.5	1.35	0.91149	0.08851	2.70	0.99653	0.00347
0.05	0.51994	0.48006	1.40	0.91924	0.08076	2.75	0.99702	0.00298
0.10	0.53983	0.46017	1.45	0.92647	0.07353	2.80	0.99744	0.00256
0.15	0.55962	0.44038	1.50	0.93319	0.06681	2.85	0.99781	0.00219
0.20	0.57926	0.42074	1.55	0.93943	0.06057	2.8782	0.998	0.002
0.25	0.59871	0.40129	1.60	0.94520	0.05480	2.90	0.99813	0.00187
0.2533	0.6	0.4	1.6449	0.95	0.05	2.95	0.99841	0.00159
0.30	0.61791	0.38209	1.65	0.95053	0.04947	3.00	0.99865	0.00135
0.35	0.63683	0.36317	1.70	0.95543	0.04457	3.05	0.99841	0.00159
0.40	0.65542	0.34458	1.75	0.95994	0.04006	3.0902	0.999	0.001
0.45	0.67364	0.32636	1.80	0.96407	0.03593	3.10	0.99886	0.00114
0.50	0.69146	0.30854	1.85	0.96784	0.03216	3.15	0.99900	0.00100
0.5244	0.7	0.3	1.90	0.97128	0.02872	3.20	0.99903	0.00097
0.55	0.70884	0.29116	1.95	0.97441	0.02559	3.25	0.99918	0.00082
0.60	0.72575	0.27425	2.00	0.97725	0.02275	3.2905	0.9995	0.0005
0.65	0.74215	0.25785	2.05	0.97982	0.02018	3.30	0.99942	0.00058
0.70	0.75804	0.24196	2.0537	0.98	0.02	3.35	0.99950	0.00050
0.75	0.77337	0.22663	2.10	0.98214	0.01786	3.40	0.99952	0.00048
0.80	0.78814	0.21186	2.15	0.98422	0.01578	3.45	0.99960	0.00040
0.8416	0.8	0.2	2.20	0.98610	0.01390	3.50	0.99966	0.00034
0.85	0.80234	0.19766	2.25	0.98778	0.01222	3.5402	0.9998	0.0002
0.90	0.81594	0.18406	2.30	0.98928	0.01072	3.55	0.99977	0.00023
0.95	0.82894	0.17106	2.3263	0.99	0.01	3.60	0.99980	0.00020
1.00	0.84134	0.15866	2.35	0.99061	0.00939	3.65	0.99981	0.00019
1.05	0.85314	0.14686	2.40	0.99180	0.00820	3.70	0.99984	0.00016
1.10	0.86433	0.13567	2.45	0.99286	0.00714	3.7195	0.9999	10^{-4}
1.15	0.87493	0.12507	2.50	0.99379	0.00621	4.27	$1 - 10^{-5}$	10^{-5}
1.20	0.88493	0.11507	2.55	0.99461	0.00539	4.75	$1 - 10^{-6}$	10^{-6}
1.25	0.89435	0.10565	2.5758	0.995	0.005	5.20	$1 - 10^{-7}$	10^{-7}
1.2816	0.9	0.1	2.60	0.99534	0.00466	5.61	$1 - 10^{-8}$	10^{-8}
1.30	0.90320	0.09680	2.65	0.99598	0.00402	6.00	$1 - 10^{-7}$	10^{-7}
$-z$	$F^*(-z)$	$F(-z)$	$-z$	$F^*(-z)$	$F(-z)$	$-z$	$F^*(-z)$	$F(-z)$

Examples: $F(0.80) = 0.78814$ $F(-3.30) = 0.00058$
 $z_{0.8} = 0.8416$ $z_{0.01} = -2.3263$

Table A2 Quantiles $\chi^2_u(n)$ of the χ^2 distribution for characteristic values of u and for n degrees of freedom.

$u =$	0.005	0.01	0.025	0.05	0.1	0.9	0.95	0.975	0.99	0.995
$n=1$	0.00	0.00	0.00	0.00	0.02	2.71	3.84	5.02	6.63	7.88
2	0.01	0.02	0.05	0.10	0.21	4.61	5.99	7.38	9.21	10.60
3	0.07	0.11	0.22	0.35	0.58	6.25	7.81	9.35	11.34	12.84
4	0.21	0.30	0.48	0.71	1.06	7.78	9.49	11.14	13.28	14.86
5	0.41	0.55	0.83	1.15	1.61	9.24	11.07	12.83	15.09	16.75
6	0.68	0.87	1.24	1.64	2.20	10.64	12.59	14.45	16.81	18.55
7	0.99	1.24	1.69	2.17	2.83	12.02	14.07	16.01	18.48	20.28
8	1.34	1.65	2.18	2.73	3.49	13.36	15.51	17.53	20.09	21.95
9	1.73	2.09	2.70	3.33	4.17	14.68	16.92	19.02	21.67	23.59
10	2.16	2.56	3.25	3.94	4.87	15.99	18.31	20.48	23.21	25.19
11	2.60	3.05	3.82	4.57	5.58	17.28	19.68	21.92	24.72	26.76
12	3.07	3.57	4.40	5.23	6.30	18.55	21.03	23.34	26.22	28.30
13	3.57	4.11	5.01	5.89	7.04	19.81	22.36	24.74	27.69	29.82
14	4.07	4.66	5.63	6.57	7.79	21.06	23.68	26.12	29.14	31.32
15	4.60	5.23	6.26	7.26	8.55	22.31	25.00	27.49	30.58	32.80
16	5.14	5.81	6.91	7.96	9.31	23.54	26.30	28.85	32.00	34.27
17	5.70	6.41	7.56	8.67	10.09	24.77	27.59	30.19	33.41	35.72
18	6.26	7.01	8.23	9.39	10.86	25.99	28.87	31.53	34.81	37.16
19	6.84	7.63	8.91	10.12	11.65	27.20	30.14	32.85	36.19	38.58
20	7.43	8.26	9.59	10.85	12.44	28.41	31.41	34.17	37.57	40.00
22	8.64	9.54	10.98	12.34	14.04	30.81	33.92	36.78	40.29	42.80
24	9.89	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98	45.56
26	11.16	12.20	13.84	15.38	17.29	35.56	38.89	41.92	45.64	48.29
28	12.46	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28	50.99
30	13.79	14.95	16.79	18.49	20.60	40.26	43.77	46.98	50.89	53.67
35	17.19	18.51	20.57	22.47	24.80	46.06	49.80	53.20	57.34	60.27
40	20.71	22.16	24.43	26.51	29.05	51.81	55.76	59.34	63.69	66.77
45	24.31	25.90	28.37	30.61	33.35	57.51	61.66	65.41	69.96	73.17
50	27.99	29.71	32.36	34.76	37.69	63.17	67.50	71.42	76.15	79.49

Examples: $\chi^2_{0.05}(5) = 1.15$ $\chi^2_{0.99}(10) = 23.21$

For $n \geq 50$: $\chi^2_u(n) = \frac{1}{2}(z_u + \sqrt{2n-1})^2$

where z_u is the u -quantile of the standard normal distribution.

Table A3 Quantiles $t_u(n)$ of the t distribution for characteristic values of u and for n degrees of freedom.

$u =$	0.9	0.95	0.975	0.99	0.995
$n=1$	3.08	6.31	12.71	31.82	63.66
2	1.89	2.92	4.30	6.96	9.92
3	1.64	2.35	3.18	4.54	5.84
4	1.53	2.13	2.78	3.75	4.60
5	1.48	2.02	2.57	3.36	4.03
6	1.44	1.94	2.45	3.14	3.71
7	1.41	1.89	2.36	3.00	3.50
8	1.40	1.86	2.31	2.90	3.36
9	1.38	1.83	2.26	2.82	3.25
10	1.37	1.81	2.23	2.76	3.17
11	1.36	1.80	2.20	2.72	3.11
12	1.36	1.78	2.18	2.68	3.05
13	1.35	1.77	2.16	2.65	3.01
14	1.35	1.76	2.14	2.62	2.98
15	1.34	1.75	2.13	2.60	2.95
16	1.34	1.75	2.12	2.58	2.92
17	1.33	1.74	2.11	2.57	2.90
18	1.33	1.73	2.10	2.55	2.88
19	1.33	1.73	2.09	2.54	2.86
20	1.33	1.72	2.09	2.53	2.85
22	1.32	1.72	2.07	2.51	2.82
24	1.32	1.71	2.06	2.49	2.80
26	1.31	1.71	2.06	2.48	2.78
28	1.31	1.70	2.05	2.47	2.76
30	1.31	1.70	2.04	2.46	2.75
35	1.31	1.69	2.03	2.44	2.72
40	1.30	1.68	2.02	2.42	2.70
45	1.30	1.68	2.01	2.41	2.69
50	1.30	1.68	2.01	2.40	2.68
∞	1.28	1.64	1.96	2.33	2.58

Example: $t_{0.95}(5) = 2.02$

For $n \geq 50$: $t_u(n) \approx z_u \sqrt{\frac{n}{n-2}}$

where z_u is the u -quantile of the standard normal distribution.

Table A4a Quantiles (k_u) of the standardized gamma distribution for characteristic values of the coefficient of skewness C_s (≤ 2) or the shape parameter κ (≥ 1).

$u = F$	$1 - u = F^*$	$C_s = 0$ $\kappa = \infty$	0.1 400	0.2 100	0.3 44.4	0.4 25.00	0.5 16.00	0.6 11.11	0.7 8.163	0.8 6.250	0.9 4.938	1.0 4.000	1.1 3.306	1.2 2.778	1.3 2.367	1.4 2.041	1.5 1.778	1.6 1.563	1.7 1.384	1.8 1.235	1.9 1.108	2.0 1.000
0.0001	0.9999	-3.72	-3.51	-3.30	-3.10	-2.90	-2.71	-2.53	-2.35	-2.18	-2.03	-1.88	-1.75	-1.63	-1.52	-1.42	-1.33	-1.25	-1.18	-1.11	-1.05	-1.00
0.0002	0.9998	-3.54	-3.35	-3.16	-2.98	-2.80	-2.63	-2.46	-2.30	-2.14	-2.00	-1.86	-1.73	-1.62	-1.51	-1.41	-1.33	-1.25	-1.17	-1.11	-1.05	-1.00
0.0005	0.9995	-3.29	-3.13	-2.97	-2.81	-2.65	-2.50	-2.36	-2.21	-2.08	-1.95	-1.82	-1.71	-1.60	-1.50	-1.40	-1.32	-1.24	-1.17	-1.11	-1.05	-1.00
0.001	0.999	-3.09	-2.95	-2.81	-2.67	-2.53	-2.40	-2.27	-2.14	-2.02	-1.90	-1.79	-1.68	-1.58	-1.48	-1.39	-1.31	-1.24	-1.17	-1.11	-1.05	-1.00
0.002	0.998	-2.88	-2.76	-2.64	-2.52	-2.40	-2.28	-2.17	-2.06	-1.95	-1.84	-1.74	-1.64	-1.55	-1.46	-1.38	-1.30	-1.23	-1.17	-1.10	-1.05	-1.00
0.005	0.995	-2.58	-2.48	-2.39	-2.29	-2.20	-2.11	-2.02	-1.93	-1.84	-1.75	-1.66	-1.58	-1.50	-1.42	-1.35	-1.28	-1.22	-1.15	-1.10	-1.04	-0.99
0.01	0.99	-2.33	-2.25	-2.18	-2.10	-2.03	-1.95	-1.88	-1.81	-1.73	-1.66	-1.59	-1.52	-1.45	-1.38	-1.32	-1.26	-1.20	-1.14	-1.09	-1.04	-0.99
0.02	0.98	-2.05	-2.00	-1.94	-1.89	-1.83	-1.78	-1.72	-1.66	-1.61	-1.55	-1.49	-1.44	-1.38	-1.32	-1.27	-1.22	-1.17	-1.12	-1.07	-1.02	-0.98
0.05	0.95	-1.64	-1.62	-1.59	-1.56	-1.52	-1.49	-1.46	-1.42	-1.39	-1.35	-1.32	-1.28	-1.24	-1.21	-1.17	-1.13	-1.09	-1.06	-1.02	-0.98	-0.95
0.1	0.9	-1.28	-1.27	-1.26	-1.25	-1.23	-1.22	-1.20	-1.18	-1.17	-1.15	-1.13	-1.11	-1.09	-1.06	-1.04	-1.02	-0.99	-0.97	-0.94	-0.92	-0.89
0.2	0.8	-0.84	-0.85	-0.85	-0.85	-0.86	-0.86	-0.86	-0.86	-0.86	-0.85	-0.85	-0.85	-0.84	-0.84	-0.83	-0.83	-0.82	-0.81	-0.80	-0.79	-0.78
0.3	0.7	-0.52	-0.54	-0.55	-0.56	-0.57	-0.58	-0.59	-0.60	-0.60	-0.61	-0.62	-0.62	-0.63	-0.63	-0.64	-0.64	-0.64	-0.64	-0.64	-0.64	-0.64
0.4	0.6	-0.25	-0.27	-0.28	-0.30	-0.31	-0.33	-0.34	-0.36	-0.37	-0.38	-0.39	-0.41	-0.42	-0.43	-0.44	-0.45	-0.46	-0.47	-0.48	-0.48	-0.49
0.5	0.5	0.00	-0.02	-0.03	-0.05	-0.07	-0.08	-0.10	-0.12	-0.13	-0.15	-0.16	-0.18	-0.20	-0.21	-0.23	-0.24	-0.25	-0.27	-0.28	-0.29	-0.31
0.6	0.4	0.25	0.24	0.22	0.21	0.19	0.17	0.16	0.14	0.12	0.10	0.09	0.07	0.05	0.04	0.02	0.00	-0.02	-0.03	-0.05	-0.07	-0.08
0.7	0.3	0.52	0.51	0.50	0.49	0.47	0.46	0.44	0.43	0.41	0.40	0.38	0.36	0.35	0.33	0.31	0.30	0.28	0.26	0.24	0.22	0.20
0.8	0.2	0.84	0.84	0.83	0.82	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.73	0.72	0.71	0.69	0.68	0.66	0.64	0.63	0.61
0.9	0.1	1.28	1.29	1.30	1.31	1.32	1.32	1.33	1.33	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.33	1.33	1.32	1.32	1.31	1.30
0.95	0.05	1.64	1.67	1.70	1.73	1.75	1.77	1.80	1.82	1.84	1.86	1.88	1.89	1.91	1.92	1.94	1.95	1.96	1.97	1.98	1.99	2.00
0.98	0.02	2.05	2.11	2.16	2.21	2.26	2.31	2.36	2.41	2.45	2.50	2.54	2.58	2.63	2.67	2.71	2.74	2.78	2.81	2.85	2.88	2.91
0.99	0.01	2.33	2.40	2.47	2.54	2.62	2.69	2.76	2.82	2.89	2.96	3.02	3.09	3.15	3.21	3.27	3.33	3.39	3.44	3.50	3.55	3.61
0.995	0.005	2.58	2.67	2.76	2.86	2.95	3.04	3.13	3.22	3.31	3.40	3.49	3.58	3.66	3.74	3.83	3.91	3.99	4.07	4.15	4.22	4.30
0.998	0.002	2.88	3.00	3.12	3.24	3.37	3.49	3.61	3.73	3.85	3.97	4.09	4.21	4.32	4.44	4.55	4.67	4.78	4.89	5.00	5.11	5.21
0.999	0.001	3.09	3.23	3.38	3.52	3.67	3.81	3.96	4.10	4.24	4.39	4.53	4.67	4.81	4.96	5.10	5.23	5.37	5.51	5.64	5.78	5.91
0.9995	0.0005	3.29	3.46	3.62	3.79	3.96	4.12	4.29	4.46	4.63	4.80	4.97	5.13	5.30	5.47	5.63	5.80	5.96	6.12	6.28	6.44	6.60
0.9998	0.0002	3.54	3.73	3.93	4.13	4.33	4.53	4.73	4.93	5.13	5.33	5.53	5.74	5.94	6.14	6.34	6.54	6.73	6.93	7.13	7.32	7.52
0.9999	0.0001	3.72	3.93	4.15	4.37	4.60	4.82	5.05	5.27	5.50	5.73	5.96	6.18	6.41	6.64	6.87	7.09	7.32	7.54	7.77	7.99	8.21

Note: $k_u = (x - \mu_X) / \sigma_X \leftrightarrow x = \mu_X + \sigma_X k_u$

Example: For $C_s = 0.5$ ($\kappa = 16$): $k_{0.98} = 2.31$

Table A4b Quantiles (k_u) of the standardized gamma distribution for characteristic values of the coefficient of skewness C_s (≥ 2) or the shape parameter κ (≤ 1).

$u = F$	$1 - u = F^*$	$C_s = 2$ $\kappa = 1$	2.1 0.907	2.2 0.826	2.3 0.76	2.4 0.69	2.5 0.64	2.6 0.59	2.7 0.549	2.8 0.510	2.9 0.476	3.0 0.444	3.1 0.416	3.2 0.391	3.3 0.367	3.4 0.346	3.5 0.327	3.6 0.309	3.7 0.292	3.8 0.277	3.9 0.263	4.0 0.250
0.0001	0.9999	-1.00	-0.95	-0.91	-0.87	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.0002	0.9998	-1.00	-0.95	-0.91	-0.87	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.0005	0.9995	-1.00	-0.95	-0.91	-0.87	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.001	0.999	-1.00	-0.95	-0.91	-0.87	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.002	0.998	-1.00	-0.95	-0.91	-0.87	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.005	0.995	-0.99	-0.95	-0.91	-0.87	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.01	0.99	-0.99	-0.95	-0.91	-0.87	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.02	0.98	-0.98	-0.94	-0.90	-0.86	-0.83	-0.80	-0.77	-0.74	-0.71	-0.69	-0.67	-0.65	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.05	0.95	-0.95	-0.91	-0.88	-0.85	-0.82	-0.79	-0.76	-0.74	-0.71	-0.69	-0.67	-0.64	-0.62	-0.61	-0.59	-0.57	-0.56	-0.54	-0.53	-0.51	-0.50
0.1	0.9	-0.89	-0.87	-0.84	-0.82	-0.79	-0.77	-0.75	-0.72	-0.70	-0.68	-0.66	-0.64	-0.62	-0.60	-0.59	-0.57	-0.55	-0.54	-0.53	-0.51	-0.50
0.2	0.8	-0.78	-0.76	-0.75	-0.74	-0.72	-0.71	-0.70	-0.68	-0.67	-0.65	-0.64	-0.62	-0.61	-0.59	-0.58	-0.56	-0.55	-0.54	-0.52	-0.51	-0.50
0.3	0.7	-0.64	-0.64	-0.64	-0.63	-0.63	-0.62	-0.62	-0.61	-0.60	-0.60	-0.59	-0.58	-0.57	-0.56	-0.55	-0.54	-0.53	-0.52	-0.51	-0.50	-0.49
0.4	0.6	-0.49	-0.49	-0.50	-0.50	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.50	-0.50	-0.49	-0.49	-0.48	-0.48	-0.47	-0.46
0.5	0.5	-0.31	-0.32	-0.33	-0.34	-0.35	-0.36	-0.37	-0.38	-0.38	-0.39	-0.40	-0.40	-0.40	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41	-0.41
0.6	0.4	-0.08	-0.10	-0.12	-0.13	-0.15	-0.16	-0.18	-0.19	-0.20	-0.22	-0.23	-0.24	-0.25	-0.26	-0.27	-0.28	-0.29	-0.29	-0.30	-0.31	-0.31
0.7	0.3	0.20	0.19	0.17	0.15	0.13	0.11	0.09	0.08	0.06	0.04	0.02	0.01	-0.01	-0.03	-0.04	-0.06	-0.07	-0.09	-0.10	-0.11	-0.13
0.8	0.2	0.61	0.59	0.57	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.23
0.9	0.1	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.22	1.21	1.20	1.18	1.16	1.15	1.13	1.11	1.10	1.08	1.06	1.04	1.02	1.00
0.95	0.05	2.00	2.00	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.00	2.00	1.99	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92
0.98	0.02	2.91	2.94	2.97	3.00	3.02	3.05	3.07	3.09	3.11	3.13	3.15	3.17	3.19	3.20	3.21	3.23	3.24	3.25	3.26	3.27	3.27
0.99	0.01	3.61	3.66	3.71	3.75	3.80	3.85	3.89	3.93	3.97	4.01	4.05	4.09	4.12	4.16	4.19	4.22	4.26	4.29	4.31	4.34	4.37
0.995	0.005	4.30	4.37	4.44	4.51	4.58	4.65	4.72	4.78	4.85	4.91	4.97	5.03	5.09	5.14	5.20	5.25	5.31	5.36	5.41	5.46	5.50
0.998	0.002	5.21	5.32	5.42	5.53	5.63	5.73	5.83	5.92	6.02	6.11	6.21	6.30	6.39	6.47	6.56	6.65	6.73	6.81	6.89	6.97	7.05
0.999	0.001	5.91	6.04	6.17	6.30	6.42	6.55	6.67	6.79	6.92	7.03	7.15	7.27	7.38	7.50	7.61	7.72	7.83	7.94	8.04	8.15	8.25
0.9995	0.0005	6.60	6.76	6.91	7.07	7.22	7.37	7.52	7.67	7.82	7.96	8.11	8.25	8.39	8.53	8.67	8.81	8.94	9.08	9.21	9.34	9.47
0.9998	0.0002	7.52	7.71	7.90	8.09	8.28	8.47	8.65	8.84	9.02	9.20											