

## 18.05 Tables

Since we generally have access to computers there is no need for the comprehensive tables of old. These tables are designed to be complete enough and easy to use for exams.

### Standard normal table of left tail probabilities.

$z$	$\Phi(z)$	$z$	$\Phi(z)$	$z$	$\Phi(z)$	$z$	$\Phi(z)$
-4.00	0.0000	-2.00	0.0228	0.00	0.5000	2.00	0.9772
-3.95	0.0000	-1.95	0.0256	0.05	0.5199	2.05	0.9798
-3.90	0.0000	-1.90	0.0287	0.10	0.5398	2.10	0.9821
-3.85	0.0001	-1.85	0.0322	0.15	0.5596	2.15	0.9842
-3.80	0.0001	-1.80	0.0359	0.20	0.5793	2.20	0.9861
-3.75	0.0001	-1.75	0.0401	0.25	0.5987	2.25	0.9878
-3.70	0.0001	-1.70	0.0446	0.30	0.6179	2.30	0.9893
-3.65	0.0001	-1.65	0.0495	0.35	0.6368	2.35	0.9906
-3.60	0.0002	-1.60	0.0548	0.40	0.6554	2.40	0.9918
-3.55	0.0002	-1.55	0.0606	0.45	0.6736	2.45	0.9929
-3.50	0.0002	-1.50	0.0668	0.50	0.6915	2.50	0.9938
-3.45	0.0003	-1.45	0.0735	0.55	0.7088	2.55	0.9946
-3.40	0.0003	-1.40	0.0808	0.60	0.7257	2.60	0.9953
-3.35	0.0004	-1.35	0.0885	0.65	0.7422	2.65	0.9960
-3.30	0.0005	-1.30	0.0968	0.70	0.7580	2.70	0.9965
-3.25	0.0006	-1.25	0.1056	0.75	0.7734	2.75	0.9970
-3.20	0.0007	-1.20	0.1151	0.80	0.7881	2.80	0.9974
-3.15	0.0008	-1.15	0.1251	0.85	0.8023	2.85	0.9978
-3.10	0.0010	-1.10	0.1357	0.90	0.8159	2.90	0.9981
-3.05	0.0011	-1.05	0.1469	0.95	0.8289	2.95	0.9984
-3.00	0.0013	-1.00	0.1587	1.00	0.8413	3.00	0.9987
-2.95	0.0016	-0.95	0.1711	1.05	0.8531	3.05	0.9989
-2.90	0.0019	-0.90	0.1841	1.10	0.8643	3.10	0.9990
-2.85	0.0022	-0.85	0.1977	1.15	0.8749	3.15	0.9992
-2.80	0.0026	-0.80	0.2119	1.20	0.8849	3.20	0.9993
-2.75	0.0030	-0.75	0.2266	1.25	0.8944	3.25	0.9994
-2.70	0.0035	-0.70	0.2420	1.30	0.9032	3.30	0.9995
-2.65	0.0040	-0.65	0.2578	1.35	0.9115	3.35	0.9996
-2.60	0.0047	-0.60	0.2743	1.40	0.9192	3.40	0.9997
-2.55	0.0054	-0.55	0.2912	1.45	0.9265	3.45	0.9997
-2.50	0.0062	-0.50	0.3085	1.50	0.9332	3.50	0.9998
-2.45	0.0071	-0.45	0.3264	1.55	0.9394	3.55	0.9998
-2.40	0.0082	-0.40	0.3446	1.60	0.9452	3.60	0.9998
-2.35	0.0094	-0.35	0.3632	1.65	0.9505	3.65	0.9999
-2.30	0.0107	-0.30	0.3821	1.70	0.9554	3.70	0.9999
-2.25	0.0122	-0.25	0.4013	1.75	0.9599	3.75	0.9999
-2.20	0.0139	-0.20	0.4207	1.80	0.9641	3.80	0.9999
-2.15	0.0158	-0.15	0.4404	1.85	0.9678	3.85	0.9999
-2.10	0.0179	-0.10	0.4602	1.90	0.9713	3.90	1.0000
-2.05	0.0202	-0.05	0.4801	1.95	0.9744	3.95	1.0000

$\Phi(z) = P(Z \leq z)$  for  $N(0, 1)$ .

*(Use interpolation to estimate  $z$  values to a 3rd decimal place.)*

### Table of Student $t$ critical values (right-tail)

The table shows  $t_{df,p}$  = the  $1 - p$  quantile of  $t(df)$ .

We only give values for  $p \leq 0.5$ . Use symmetry to find the values for  $p > 0.5$ , e.g.

$$t_{5,0.975} = -t_{5,0.025}$$

In R notation  $t_{df,p} = \text{qt}(1-p, df)$ .

df \ p	0.005	0.010	0.015	0.020	0.025	0.030	0.040	0.050	0.100	0.200	0.300	0.400	0.500
1	63.66	31.82	21.20	15.89	12.71	10.58	7.92	6.31	3.08	1.38	0.73	0.32	0.00
2	9.92	6.96	5.64	4.85	4.30	3.90	3.32	2.92	1.89	1.06	0.62	0.29	0.00
3	5.84	4.54	3.90	3.48	3.18	2.95	2.61	2.35	1.64	0.98	0.58	0.28	0.00
4	4.60	3.75	3.30	3.00	2.78	2.60	2.33	2.13	1.53	0.94	0.57	0.27	0.00
5	4.03	3.36	3.00	2.76	2.57	2.42	2.19	2.02	1.48	0.92	0.56	0.27	0.00
6	3.71	3.14	2.83	2.61	2.45	2.31	2.10	1.94	1.44	0.91	0.55	0.26	0.00
7	3.50	3.00	2.71	2.52	2.36	2.24	2.05	1.89	1.41	0.90	0.55	0.26	0.00
8	3.36	2.90	2.63	2.45	2.31	2.19	2.00	1.86	1.40	0.89	0.55	0.26	0.00
9	3.25	2.82	2.57	2.40	2.26	2.15	1.97	1.83	1.38	0.88	0.54	0.26	0.00
10	3.17	2.76	2.53	2.36	2.23	2.12	1.95	1.81	1.37	0.88	0.54	0.26	0.00
16	2.92	2.58	2.38	2.24	2.12	2.02	1.87	1.75	1.34	0.86	0.54	0.26	0.00
17	2.90	2.57	2.37	2.22	2.11	2.02	1.86	1.74	1.33	0.86	0.53	0.26	0.00
18	2.88	2.55	2.36	2.21	2.10	2.01	1.86	1.73	1.33	0.86	0.53	0.26	0.00
19	2.86	2.54	2.35	2.20	2.09	2.00	1.85	1.73	1.33	0.86	0.53	0.26	0.00
20	2.85	2.53	2.34	2.20	2.09	1.99	1.84	1.72	1.33	0.86	0.53	0.26	0.00
21	2.83	2.52	2.33	2.19	2.08	1.99	1.84	1.72	1.32	0.86	0.53	0.26	0.00
22	2.82	2.51	2.32	2.18	2.07	1.98	1.84	1.72	1.32	0.86	0.53	0.26	0.00
23	2.81	2.50	2.31	2.18	2.07	1.98	1.83	1.71	1.32	0.86	0.53	0.26	0.00
24	2.80	2.49	2.31	2.17	2.06	1.97	1.83	1.71	1.32	0.86	0.53	0.26	0.00
25	2.79	2.49	2.30	2.17	2.06	1.97	1.82	1.71	1.32	0.86	0.53	0.26	0.00
30	2.75	2.46	2.28	2.15	2.04	1.95	1.81	1.70	1.31	0.85	0.53	0.26	0.00
31	2.74	2.45	2.27	2.14	2.04	1.95	1.81	1.70	1.31	0.85	0.53	0.26	0.00
32	2.74	2.45	2.27	2.14	2.04	1.95	1.81	1.69	1.31	0.85	0.53	0.26	0.00
33	2.73	2.44	2.27	2.14	2.03	1.95	1.81	1.69	1.31	0.85	0.53	0.26	0.00
34	2.73	2.44	2.27	2.14	2.03	1.95	1.80	1.69	1.31	0.85	0.53	0.26	0.00
35	2.72	2.44	2.26	2.13	2.03	1.94	1.80	1.69	1.31	0.85	0.53	0.26	0.00
40	2.70	2.42	2.25	2.12	2.02	1.94	1.80	1.68	1.30	0.85	0.53	0.26	0.00
41	2.70	2.42	2.25	2.12	2.02	1.93	1.80	1.68	1.30	0.85	0.53	0.25	0.00
42	2.70	2.42	2.25	2.12	2.02	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
43	2.70	2.42	2.24	2.12	2.02	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
44	2.69	2.41	2.24	2.12	2.02	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
45	2.69	2.41	2.24	2.12	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
46	2.69	2.41	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
47	2.68	2.41	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
48	2.68	2.41	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00
49	2.68	2.40	2.24	2.11	2.01	1.93	1.79	1.68	1.30	0.85	0.53	0.25	0.00

### Table of $\chi^2$ critical values (right-tail)

The table shows  $c_{df,p}$  = the  $1 - p$  quantile of  $\chi^2(df)$ .

In R notation  $c_{df,p} = \text{qchisq}(1-p, df)$ .

df\p	0.010	0.025	0.050	0.100	0.200	0.300	0.500	0.700	0.800	0.900	0.950	0.975	0.990
1	6.63	5.02	3.84	2.71	1.64	1.07	0.45	0.15	0.06	0.02	0.00	0.00	0.00
2	9.21	7.38	5.99	4.61	3.22	2.41	1.39	0.71	0.45	0.21	0.10	0.05	0.02
3	11.34	9.35	7.81	6.25	4.64	3.66	2.37	1.42	1.01	0.58	0.35	0.22	0.11
4	13.28	11.14	9.49	7.78	5.99	4.88	3.36	2.19	1.65	1.06	0.71	0.48	0.30
5	15.09	12.83	11.07	9.24	7.29	6.06	4.35	3.00	2.34	1.61	1.15	0.83	0.55
6	16.81	14.45	12.59	10.64	8.56	7.23	5.35	3.83	3.07	2.20	1.64	1.24	0.87
7	18.48	16.01	14.07	12.02	9.80	8.38	6.35	4.67	3.82	2.83	2.17	1.69	1.24
8	20.09	17.53	15.51	13.36	11.03	9.52	7.34	5.53	4.59	3.49	2.73	2.18	1.65
9	21.67	19.02	16.92	14.68	12.24	10.66	8.34	6.39	5.38	4.17	3.33	2.70	2.09
10	23.21	20.48	18.31	15.99	13.44	11.78	9.34	7.27	6.18	4.87	3.94	3.25	2.56
16	32.00	28.85	26.30	23.54	20.47	18.42	15.34	12.62	11.15	9.31	7.96	6.91	5.81
17	33.41	30.19	27.59	24.77	21.61	19.51	16.34	13.53	12.00	10.09	8.67	7.56	6.41
18	34.81	31.53	28.87	25.99	22.76	20.60	17.34	14.44	12.86	10.86	9.39	8.23	7.01
19	36.19	32.85	30.14	27.20	23.90	21.69	18.34	15.35	13.72	11.65	10.12	8.91	7.63
20	37.57	34.17	31.41	28.41	25.04	22.77	19.34	16.27	14.58	12.44	10.85	9.59	8.26
21	38.93	35.48	32.67	29.62	26.17	23.86	20.34	17.18	15.44	13.24	11.59	10.28	8.90
22	40.29	36.78	33.92	30.81	27.30	24.94	21.34	18.10	16.31	14.04	12.34	10.98	9.54
23	41.64	38.08	35.17	32.01	28.43	26.02	22.34	19.02	17.19	14.85	13.09	11.69	10.20
24	42.98	39.36	36.42	33.20	29.55	27.10	23.34	19.94	18.06	15.66	13.85	12.40	10.86
25	44.31	40.65	37.65	34.38	30.68	28.17	24.34	20.87	18.94	16.47	14.61	13.12	11.52
30	50.89	46.98	43.77	40.26	36.25	33.53	29.34	25.51	23.36	20.60	18.49	16.79	14.95
31	52.19	48.23	44.99	41.42	37.36	34.60	30.34	26.44	24.26	21.43	19.28	17.54	15.66
32	53.49	49.48	46.19	42.58	38.47	35.66	31.34	27.37	25.15	22.27	20.07	18.29	16.36
33	54.78	50.73	47.40	43.75	39.57	36.73	32.34	28.31	26.04	23.11	20.87	19.05	17.07
34	56.06	51.97	48.60	44.90	40.68	37.80	33.34	29.24	26.94	23.95	21.66	19.81	17.79
35	57.34	53.20	49.80	46.06	41.78	38.86	34.34	30.18	27.84	24.80	22.47	20.57	18.51
40	63.69	59.34	55.76	51.81	47.27	44.16	39.34	34.87	32.34	29.05	26.51	24.43	22.16
41	64.95	60.56	56.94	52.95	48.36	45.22	40.34	35.81	33.25	29.91	27.33	25.21	22.91
42	66.21	61.78	58.12	54.09	49.46	46.28	41.34	36.75	34.16	30.77	28.14	26.00	23.65
43	67.46	62.99	59.30	55.23	50.55	47.34	42.34	37.70	35.07	31.63	28.96	26.79	24.40
44	68.71	64.20	60.48	56.37	51.64	48.40	43.34	38.64	35.97	32.49	29.79	27.57	25.15
45	69.96	65.41	61.66	57.51	52.73	49.45	44.34	39.58	36.88	33.35	30.61	28.37	25.90
46	71.20	66.62	62.83	58.64	53.82	50.51	45.34	40.53	37.80	34.22	31.44	29.16	26.66
47	72.44	67.82	64.00	59.77	54.91	51.56	46.34	41.47	38.71	35.08	32.27	29.96	27.42
48	73.68	69.02	65.17	60.91	55.99	52.62	47.34	42.42	39.62	35.95	33.10	30.75	28.18
49	74.92	70.22	66.34	62.04	57.08	53.67	48.33	43.37	40.53	36.82	33.93	31.55	28.94

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18.05 Introduction to Probability and Statistics

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