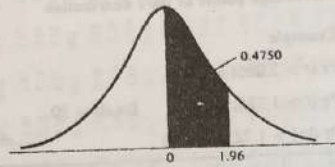


Statistical Table 2.1
Areas Under the Standard Normal Distribution

Example

$$\Pr(0 \leq z \leq 1.96) = 0.4750$$

$$\Pr(z \geq 1.96) = 0.5 - 0.4750 = 0.025$$



<i>z</i>	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Note: This table gives the area in the right-hand tail of the distribution (i.e., $z \geq 0$). But since the normal distribution is symmetrical about $z = 0$, the area in the left-hand tail is the same as the area in the corresponding right-hand tail. For example, $\Pr(-1.96 \leq z \leq 0) = 0.4750$. Therefore, $\Pr(-1.96 \leq z \leq 1.96) = 2(0.4750) = 0.95$.

Statistical Table 2.2 **Percentage Points of the t Distribution**

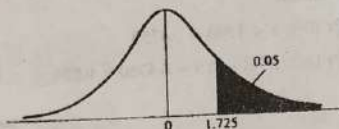
Percentage points of the t distribution

Example

$$\Pr(t > 2.086) = 0.025$$

$$\Pr(t > 1.725) = 0.05 \quad \text{for } df = 20$$

$$\Pr(|t| > 1.725) = 0.10$$



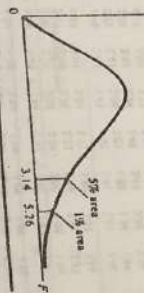
Pr df	0.25 0.50	0.10 0.20	0.05 0.10	0.025 0.05	0.01 0.02	0.005 0.010	0.001 0.002
1	1.000	3.078	6.314	12.706	31.821	63.657	318.31
2	0.816	1.886	2.920	4.303	6.965	9.925	22.327
3	0.765	1.638	2.353	3.182	4.541	5.841	10.214
4	0.741	1.533	2.132	2.776	3.747	4.604	7.173
5	0.727	1.476	2.015	2.571	3.365	4.032	5.893
6	0.718	1.440	1.943	2.447	3.143	3.707	5.208
7	0.711	1.415	1.895	2.365	2.998	3.499	4.785
8	0.706	1.397	1.860	2.306	2.896	3.355	4.501
9	0.703	1.383	1.833	2.262	2.821	3.250	4.297
10	0.700	1.372	1.812	2.228	2.764	3.169	4.144
11	0.697	1.363	1.796	2.201	2.718	3.106	4.025
12	0.695	1.356	1.782	2.179	2.681	3.055	3.930
13	0.694	1.350	1.771	2.160	2.650	3.012	3.852
14	0.692	1.345	1.761	2.145	2.624	2.977	3.787
15	0.691	1.341	1.753	2.131	2.602	2.947	3.733
16	0.690	1.337	1.746	2.120	2.583	2.921	3.686
17	0.689	1.333	1.740	2.110	2.567	2.898	3.646
18	0.688	1.330	1.734	2.101	2.552	2.878	3.610
19	0.688	1.328	1.729	2.093	2.539	2.861	3.579
20	0.687	1.325	1.725	2.086	2.528	2.845	3.552
21	0.686	1.323	1.721	2.080	2.518	2.831	3.527
22	0.686	1.321	1.717	2.074	2.508	2.819	3.505
23	0.685	1.319	1.714	2.069	2.500	2.807	3.485
24	0.685	1.318	1.711	2.064	2.492	2.797	3.467
25	0.684	1.316	1.708	2.060	2.485	2.787	3.450
26	0.684	1.315	1.706	2.056	2.479	2.779	3.435
27	0.684	1.314	1.703	2.052	2.473	2.771	3.421
28	0.683	1.313	1.701	2.048	2.467	2.763	3.408
29	0.683	1.311	1.699	2.045	2.462	2.756	3.396
30	0.683	1.310	1.697	2.042	2.457	2.750	3.385
40	0.681	1.303	1.684	2.021	2.423	2.704	3.307
60	0.679	1.296	1.671	2.000	2.390	2.660	3.232
120	0.677	1.289	1.658	1.980	2.358	2.617	3.160
∞	0.674	1.282	1.645	1.960	2.326	2.576	3.090

Note: The smaller probability shown at the head of each column is the area in one tail; the larger probability is the area in both tails.

Source: From E. S. Pearson and H. O. Hartley, eds., *Biometrika Tables for Statisticians*, vol. 1, 3d ed., table 12, Cambridge University Press, New York, 1966. Reproduced by permission of the editors and trustees of *Biometrika*.

Table 2.3
Upper Percentage Points of the F Distribution

Example
 $Pr(F > 1.59) = 0.25$
for $df_1 = 10$
 $Pr(F > 2.42) = 0.10$
and $N_2 = 9$
 $Pr(F > 3.16) = 0.05$
 $Pr(F > 5.26) = 0.01$



df for denominator N_2	df for numerator N_1												Pr	df for denominator N_2
	1	2	3	4	5	6	7	8	9	10	11	12		
1	161	199	225	245	262	277	291	304	316	327	338	348	0.10	1
2	100	118	130	140	148	156	163	170	176	182	187	192	0.10	2
3	80	94	103	111	118	124	130	135	140	145	149	153	0.10	3
4	70	82	89	96	102	107	112	116	121	125	129	133	0.10	4
5	63	74	80	85	90	94	98	102	106	110	114	117	0.10	5
6	58	68	73	78	82	86	89	93	96	100	103	106	0.10	6
7	54	64	69	73	77	81	84	87	90	93	96	99	0.10	7
8	51	60	65	69	73	76	79	82	85	88	91	94	0.10	8
9	48	57	62	66	69	72	75	78	81	84	87	90	0.10	9
10	46	54	59	63	66	69	72	75	78	81	84	87	0.10	10
15	40	47	51	54	57	59	62	64	66	68	70	72	0.10	15
20	37	44	48	51	53	55	57	59	61	63	65	67	0.10	20
30	34	40	43	46	48	50	52	54	56	58	60	62	0.10	30
40	32	38	41	43	45	47	49	51	53	55	57	59	0.10	40
50	31	36	39	41	43	45	47	49	51	53	55	57	0.10	50
60	30	35	38	40	42	44	46	48	50	52	54	56	0.10	60
80	28	33	36	38	40	42	44	46	48	50	52	54	0.10	80
100	27	32	35	37	39	41	43	45	47	49	51	53	0.10	100
120	26	31	34	36	38	40	42	44	46	48	50	52	0.10	120
150	25	30	33	35	37	39	41	43	45	47	49	51	0.10	150
200	24	29	32	34	36	38	40	42	44	46	48	50	0.10	200
300	23	28	31	33	35	37	39	41	43	45	47	49	0.10	300
500	22	27	30	32	34	36	38	40	42	44	46	48	0.10	500
∞	21	26	29	31	33	35	37	39	41	43	45	47	0.10	∞
1	161	199	225	245	262	277	291	304	316	327	338	348	0.05	1
2	100	118	130	140	148	156	163	170	176	182	187	192	0.05	2
3	80	94	103	111	118	124	130	135	140	145	149	153	0.05	3
4	70	82	89	96	102	107	112	116	121	125	129	133	0.05	4
5	63	74	80	85	90	94	98	102	106	110	114	117	0.05	5
6	58	68	73	78	82	86	89	93	96	100	103	106	0.05	6
7	54	64	69	73	77	81	84	87	90	93	96	99	0.05	7
8	51	60	65	69	73	76	79	82	85	88	91	94	0.05	8
9	48	57	62	66	69	72	75	78	81	84	87	90	0.05	9
10	46	54	59	63	66	69	72	75	78	81	84	87	0.05	10
15	40	47	51	54	57	59	62	64	66	68	70	72	0.05	15
20	37	44	48	51	53	55	57	59	61	63	65	67	0.05	20
30	34	40	43	46	48	50	52	54	56	58	60	62	0.05	30
40	32	38	41	43	45	47	49	51	53	55	57	59	0.05	40
50	31	36	39	41	43	45	47	49	51	53	55	57	0.05	50
60	30	35	38	40	42	44	46	48	50	52	54	56	0.05	60
80	28	33	36	38	40	42	44	46	48	50	52	54	0.05	80
100	27	32	35	37	39	41	43	45	47	49	51	53	0.05	100
120	26	31	34	36	38	40	42	44	46	48	50	52	0.05	120
150	25	30	33	35	37	39	41	43	45	47	49	51	0.05	150
200	24	29	32	34	36	38	40	42	44	46	48	50	0.05	200
300	23	28	31	33	35	37	39	41	43	45	47	49	0.05	300
500	22	27	30	32	34	36	38	40	42	44	46	48	0.05	500
∞	21	26	29	31	33	35	37	39	41	43	45	47	0.05	∞
1	161	199	225	245	262	277	291	304	316	327	338	348	0.01	1
2	100	118	130	140	148	156	163	170	176	182	187	192	0.01	2
3	80	94	103	111	118	124	130	135	140	145	149	153	0.01	3
4	70	82	89	96	102	107	112	116	121	125	129	133	0.01	4
5	63	74	80	85	90	94	98	102	106	110	114	117	0.01	5
6	58	68	73	78	82	86	89	93	96	100	103	106	0.01	6
7	54	64	69	73	77	81	84	87	90	93	96	99	0.01	7
8	51	60	65	69	73	76	79	82	85	88	91	94	0.01	8
9	48	57	62	66	69	72	75	78	81	84	87	90	0.01	9
10	46	54	59	63	66	69	72	75	78	81	84	87	0.01	10
15	40	47	51	54	57	59	62	64	66	68	70	72	0.01	15
20	37	44	48	51	53	55	57	59	61	63	65	67	0.01	20
30	34	40	43	46	48	50	52	54	56	58	60	62	0.01	30
40	32	38	41	43	45	47	49	51	53	55	57	59	0.01	40
50	31	36	39	41	43	45	47	49	51	53	55	57	0.01	50
60	30	35	38	40	42	44	46	48	50	52	54	56	0.01	60
80	28	33	36	38	40	42	44	46	48	50	52	54	0.01	80
100	27	32	35	37	39	41	43	45	47	49	51	53	0.01	100
120	26	31	34	36	38	40	42	44	46	48	50	52	0.01	120
150	25	30	33	35	37	39	41	43	45	47	49	51	0.01	150
200	24	29	32	34	36	38	40	42	44	46	48	50	0.01	200
300	23	28	31	33	35	37	39	41	43	45	47	49	0.01	300
500	22	27	30	32	34	36	38	40	42	44	46	48	0.01	500
∞	21	26	29	31	33	35	37	39	41	43	45	47	0.01	∞

Source: From E. S. Pearson and H. O. Hartley, eds., *Biometrika Tables for Statisticians*, vol. 1, 3rd ed., table 18, Cambridge University Press, New York, 1966. Reproduced by permission of the editors and location of Biometrika.

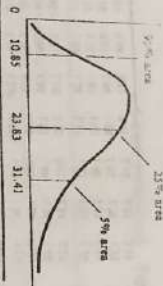
15, 10, 0.05

at for distance meter	at for summation N_i												at for summation N_i												at for distance meter
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20					
1	1.48	1.60	1.80	1.99	1.99	1.58	1.57	1.56	1.56	1.55	1.55	1.54	1.53	1.52	1.51	1.51	1.50	1.49	1.48	25					
2	1.49	1.57	1.71	2.01	2.01	1.62	1.61	1.60	1.59	1.58	1.58	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	30					
3	1.50	1.59	1.77	2.11	2.11	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	35					
4	1.51	1.60	1.80	2.19	2.19	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.52	1.51	40					
5	1.52	1.61	1.82	2.23	2.23	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.52	45					
6	1.53	1.62	1.83	2.28	2.28	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	50					
7	1.54	1.63	1.84	2.33	2.33	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	55					
8	1.55	1.64	1.85	2.38	2.38	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	60					
9	1.56	1.65	1.86	2.43	2.43	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	65					
10	1.57	1.66	1.87	2.48	2.48	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	70					
11	1.58	1.67	1.88	2.53	2.53	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	75					
12	1.59	1.68	1.89	2.58	2.58	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	80					
13	1.60	1.69	1.90	2.63	2.63	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	85					
14	1.61	1.70	1.91	2.68	2.68	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	90					
15	1.62	1.71	1.92	2.73	2.73	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	95					
16	1.63	1.72	1.93	2.78	2.78	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	100					
17	1.64	1.73	1.94	2.83	2.83	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	105					
18	1.65	1.74	1.95	2.88	2.88	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	110					
19	1.66	1.75	1.96	2.93	2.93	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	115					
20	1.67	1.76	1.97	2.98	2.98	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	120					
21	1.68	1.77	1.98	3.03	3.03	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	125					
22	1.69	1.78	1.99	3.08	3.08	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	130					
23	1.70	1.79	2.00	3.13	3.13	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	135					
24	1.71	1.80	2.01	3.18	3.18	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	140					
25	1.72	1.81	2.02	3.23	3.23	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	145					
26	1.73	1.82	2.03	3.28	3.28	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	150					
27	1.74	1.83	2.04	3.33	3.33	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	155					
28	1.75	1.84	2.05	3.38	3.38	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	160					
29	1.76	1.85	2.06	3.43	3.43	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	165					
30	1.77	1.86	2.07	3.48	3.48	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	170					
31	1.78	1.87	2.08	3.53	3.53	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	175					
32	1.79	1.88	2.09	3.58	3.58	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	180					
33	1.80	1.89	2.10	3.63	3.63	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	185					
34	1.81	1.90	2.11	3.68	3.68	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	190					
35	1.82	1.91	2.12	3.73	3.73	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	195					
36	1.83	1.92	2.13	3.78	3.78	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	200					
37	1.84	1.93	2.14	3.83	3.83	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	205					
38	1.85	1.94	2.15	3.88	3.88	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	210					
39	1.86	1.95	2.16	3.93	3.93	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	215					
40	1.87	1.96	2.17	3.98	3.98	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	220					
41	1.88	1.97	2.18	4.03	4.03	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	225					
42	1.89	1.98	2.19	4.08	4.08	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	230					
43	1.90	1.99	2.20	4.13	4.13	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	235					
44	1.91	2.00	2.21	4.18	4.18	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	240					
45	1.92	2.01	2.22	4.23	4.23	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	245					
46	1.93	2.02	2.23	4.28	4.28	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	250					
47	1.94	2.03	2.24	4.33	4.33	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	255					
48	1.95	2.04	2.25	4.38	4.38	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	260					
49	1.96	2.05	2.26	4.43	4.43	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	265					
50	1.97	2.06	2.27	4.48	4.48	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	270					
51	1.98	2.07	2.28	4.53	4.53	2.11	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	275					
52	1.99	2.08	2.29	4.58	4.58	2.12	2.11	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	280					
53	2.00	2.09	2.30	4.63	4.63	2.13	2.12	2.11	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.00	285					
54	2.01	2.10	2.31	4.68	4.68	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	290					
55	2.02	2.11	2.32	4.73	4.73	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	295					
56	2.03	2.12	2.33	4.78	4.78	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	300					
57	2.04	2.13	2.34	4.83	4.83	2.17	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.07	2.06	2.05	2.04	305					
58	2.05	2.14	2.35	4.88	4.88	2.18	2.17	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.07	2.06	2.05	310					
59	2.06	2.15	2.36	4.93	4.93	2.19	2.18	2.17	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.07	2.06	315					
60	2.07	2.16	2.37	4.98	4.98	2.20	2.19	2.18	2.17	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.07	320					
61	2.08	2.17	2.38	5.03	5.03	2.21	2.20	2.19	2.18	2.17	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.08	325					
62	2.09	2.18	2.39	5.08	5.08	2.22	2.21	2.20	2.19	2.18	2.17	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	330					
63	2.10	2.19	2.40	5.13	5.13	2.23	2.22	2.21	2.20	2.19	2.18	2.17	2.16	2.15	2.14	2.13	2.12	2.11	2.10	335					
64	2.11	2.20	2.41	5.18	5.18	2.24	2.23	2.22	2.21	2.20	2.19	2.18	2.17	2.16	2.15	2.14	2.13	2.12	2.11	340					
65	2.12	2.21	2.42																						

Statistical Table 2.3 (cont.)

df for denominator N_2	Pr	df for numerator N_1												df for numerator N_1												df for denominator Pr	N_2
		1	2	3	4	5	6	7	8	9	10	11	12	15	20	24	30	40	50	60	100	120	200	500	∞		
22	1.40	1.48	1.47	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	25
22	10	1.95	1.96	1.95	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	05
22	10	3.44	3.44	3.43	3.42	3.40	3.39	3.38	3.37	3.36	3.35	3.34	3.33	3.32	3.31	3.30	3.29	3.28	3.27	3.26	3.25	3.24	3.23	3.22	3.21	3.20	05
22	10	5.92	5.92	5.91	5.89	5.88	5.87	5.86	5.85	5.84	5.83	5.82	5.81	5.80	5.79	5.78	5.77	5.76	5.75	5.74	5.73	5.72	5.71	5.70	5.69	5.68	05
24	10	1.39	1.47	1.46	1.44	1.43	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	25
24	10	1.83	1.84	1.83	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	05
24	10	2.83	2.84	2.83	2.81	2.80	2.78	2.77	2.76	2.75	2.74	2.73	2.72	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	05
24	10	4.28	4.30	4.29	4.27	4.26	4.25	4.24	4.23	4.22	4.21	4.20	4.19	4.18	4.17	4.16	4.15	4.14	4.13	4.12	4.11	4.10	4.09	4.08	4.07	4.06	05
24	10	7.82	7.85	7.84	7.82	7.80	7.78	7.76	7.74	7.72	7.70	7.68	7.66	7.64	7.62	7.60	7.58	7.56	7.54	7.52	7.50	7.48	7.46	7.44	7.42	7.40	05
26	10	1.38	1.46	1.45	1.43	1.42	1.41	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	25
26	10	1.81	1.82	1.81	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	05
26	10	2.81	2.82	2.81	2.79	2.78	2.76	2.75	2.74	2.73	2.72	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.58	2.57	05
26	10	4.27	4.33	4.32	4.29	4.27	4.25	4.24	4.23	4.22	4.21	4.20	4.19	4.18	4.17	4.16	4.15	4.14	4.13	4.12	4.11	4.10	4.09	4.08	4.07	4.06	05
26	10	7.72	7.82	7.80	7.76	7.73	7.70	7.67	7.64	7.62	7.60	7.58	7.56	7.54	7.52	7.50	7.48	7.46	7.44	7.42	7.40	7.38	7.36	7.34	7.32	7.30	05
28	10	1.37	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	25
28	10	1.80	1.81	1.80	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	05
28	10	2.80	2.80	2.79	2.77	2.76	2.75	2.74	2.73	2.72	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.58	2.57	2.56	05
28	10	4.26	4.32	4.31	4.28	4.26	4.24	4.23	4.22	4.21	4.20	4.19	4.18	4.17	4.16	4.15	4.14	4.13	4.12	4.11	4.10	4.09	4.08	4.07	4.06	4.05	05
28	10	7.64	7.74	7.72	7.68	7.65	7.62	7.59	7.56	7.54	7.52	7.50	7.48	7.46	7.44	7.42	7.40	7.38	7.36	7.34	7.32	7.30	7.28	7.26	7.24	7.22	05
30	10	1.36	1.44	1.43	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	25
30	10	1.78	1.79	1.78	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	05
30	10	2.79	2.80	2.79	2.77	2.76	2.75	2.74	2.73	2.72	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.58	2.57	2.56	05
30	10	4.17	4.23	4.22	4.19	4.17	4.15	4.14	4.13	4.12	4.11	4.10	4.09	4.08	4.07	4.06	4.05	4.04	4.03	4.02	4.01	4.00	3.99	3.98	3.97	3.96	05
30	10	7.56	7.66	7.64	7.60	7.57	7.54	7.51	7.48	7.46	7.44	7.42	7.40	7.38	7.36	7.34	7.32	7.30	7.28	7.26	7.24	7.22	7.20	7.18	7.16	7.14	05
40	10	1.35	1.43	1.42	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	25
40	10	1.76	1.77	1.76	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	05
40	10	2.78	2.78	2.77	2.75	2.74	2.72	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.58	2.57	2.56	2.55	2.54	2.53	05
40	10	4.15	4.21	4.20	4.17	4.15	4.13	4.12	4.11	4.10	4.09	4.08	4.07	4.06	4.05	4.04	4.03	4.02	4.01	4.00	3.99	3.98	3.97	3.96	3.95	3.94	05
40	10	7.54	7.64	7.62	7.58	7.55	7.52	7.49	7.46	7.44	7.42	7.40	7.38	7.36	7.34	7.32	7.30	7.28	7.26	7.24	7.22	7.20	7.18	7.16	7.14	7.12	05
60	10	1.34	1.42	1.41	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	25
60	10	1.77	1.78	1.77	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	05
60	10	2.77	2.78	2.77	2.75	2.74	2.72	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.58	2.57	2.56	2.55	2.54	2.53	05
60	10	4.14	4.20	4.19	4.16	4.14	4.12	4.11	4.10	4.09	4.08	4.07	4.06	4.05	4.04	4.03	4.02	4.01	4.00	3.99	3.98	3.97	3.96	3.95	3.94	3.93	05
60	10	7.52	7.62	7.60	7.56	7.53	7.50	7.47	7.44	7.42	7.40	7.38	7.36	7.34	7.32	7.30	7.28	7.26	7.24	7.22	7.20	7.18	7.16	7.14	7.12	7.10	05
120	10	1.33	1.41	1.40	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	25
120	10	1.76	1.77	1.76	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	05
120	10	2.76	2.77	2.76	2.74	2.73	2.71	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.58	2.57	2.56	2.55	2.54	2.53	2.52	05
120	10	4.13	4.19	4.18	4.15	4.13	4.11	4.10	4.09	4.08	4.07	4.06	4.05	4.04	4.03	4.02	4.01	4.00	3.99	3.98	3.97	3.96	3.95	3.94	3.93	3.92	05
120	10	7.50	7.60	7.58	7.54	7.51	7.48	7.45	7.42	7.40	7.38	7.36	7.34	7.32	7.30	7.28	7.26	7.24	7.22	7.20	7.18	7.16	7.14	7.12	7.10	7.08	05
200	10	1.32	1.39	1.38	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	25
200	10	1.75	1.76	1.75	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.52	05
200	10	2.75	2.76	2.75	2.73	2.72	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.62	2.61	2.60	2.59	2.58	2.57	2.56	2.55	2.54	2.53	2.52	2.51	05
200	10	4.12	4.18	4.17	4.14	4.12	4.10	4.09	4.08	4.07	4.06	4.05	4.04	4.03	4.02	4.01	4.00	3.99	3.98	3.97	3.96	3.95	3.94	3.93	3.92	3.91	05
200	10	7.48	7.58	7.56	7.52	7.49	7.46	7.43	7.40	7.38	7.36	7.34	7.32	7.30	7.28	7.26	7.24	7.22	7.20	7.18	7.16	7.14	7.12	7.10	7.08	7.06	05</

Example
 $\Pr(\chi^2 > 10.85) = 0.95$
 $\Pr(\chi^2 > 23.83) = 0.25$ for $df = 20$
 $\Pr(\chi^2 > 31.41) = 0.05$



Degrees of Freedom	.995	.990	.975	.950	.900	.750	.500	.250	.100	.050	.025	.010	.005
1	392.956	157.084	102.977	78.781	63.691	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
2	185.085	139.193	102.977	78.781	63.691	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
3	101.280	101.280	101.280	78.781	63.691	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
4	71.420	71.420	71.420	71.420	63.691	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
5	62.557	62.557	62.557	62.557	62.557	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
6	55.919	55.919	55.919	55.919	55.919	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
7	50.154	50.154	50.154	50.154	50.154	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
8	45.929	45.929	45.929	45.929	45.929	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
9	42.929	42.929	42.929	42.929	42.929	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
10	40.756	40.756	40.756	40.756	40.756	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
11	39.187	39.187	39.187	39.187	39.187	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
12	37.675	37.675	37.675	37.675	37.675	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
13	36.215	36.215	36.215	36.215	36.215	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
14	34.804	34.804	34.804	34.804	34.804	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
15	33.434	33.434	33.434	33.434	33.434	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
16	32.112	32.112	32.112	32.112	32.112	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
17	30.839	30.839	30.839	30.839	30.839	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
18	29.615	29.615	29.615	29.615	29.615	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
19	28.439	28.439	28.439	28.439	28.439	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
20	27.304	27.304	27.304	27.304	27.304	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
21	26.212	26.212	26.212	26.212	26.212	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
22	25.162	25.162	25.162	25.162	25.162	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
23	24.142	24.142	24.142	24.142	24.142	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
24	23.141	23.141	23.141	23.141	23.141	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
25	22.159	22.159	22.159	22.159	22.159	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
26	21.194	21.194	21.194	21.194	21.194	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
27	20.244	20.244	20.244	20.244	20.244	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
28	19.308	19.308	19.308	19.308	19.308	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
29	18.385	18.385	18.385	18.385	18.385	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
30	17.474	17.474	17.474	17.474	17.474	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
31	16.574	16.574	16.574	16.574	16.574	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
32	15.684	15.684	15.684	15.684	15.684	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
33	14.803	14.803	14.803	14.803	14.803	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
34	13.931	13.931	13.931	13.931	13.931	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
35	13.067	13.067	13.067	13.067	13.067	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
36	12.211	12.211	12.211	12.211	12.211	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
37	11.362	11.362	11.362	11.362	11.362	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
38	10.520	10.520	10.520	10.520	10.520	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
39	9.685	9.685	9.685	9.685	9.685	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
40	8.857	8.857	8.857	8.857	8.857	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
41	8.035	8.035	8.035	8.035	8.035	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
42	7.218	7.218	7.218	7.218	7.218	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
43	6.405	6.405	6.405	6.405	6.405	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
44	5.596	5.596	5.596	5.596	5.596	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
45	4.791	4.791	4.791	4.791	4.791	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
46	3.989	3.989	3.989	3.989	3.989	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
47	3.190	3.190	3.190	3.190	3.190	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
48	2.393	2.393	2.393	2.393	2.393	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
49	1.597	1.597	1.597	1.597	1.597	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142
50	0.799	0.799	0.799	0.799	0.799	50.000	40.000	31.821	25.000	20.000	16.266	13.277	11.142

* For df greater than 100 the expression: $\sqrt{2df} - \sqrt{2df - 1} = Z$ follows the standard normal distribution, where Z represents the degree of freedom.

Source: Adapted from E. S. Pearson and H. O. Hartley, eds. *Biometrika Tables for Statisticians*, vol. 1, 3d ed., table 8, Cambridge University Press, New York, 1966. Reproduced by permission of the editors and trustees of BIC, with-
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