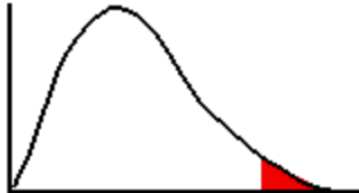




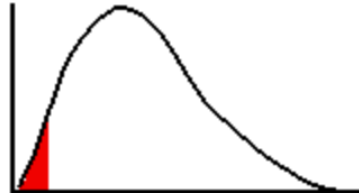


## The Chi-Squared Distribution Table

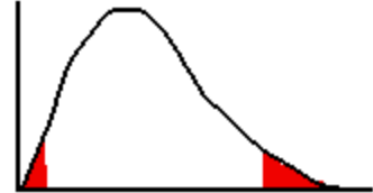
### HOW TO USE THIS GRAPH:



To find this region use the value equivalent to  $\alpha$  at the top of the table.



To find this region use the value equivalent to  $1 - \alpha$  at the top of the table.



To find the region to the left, use  $1 - \alpha/2$ .  
To find the region to the right, use  $\alpha/2$ .

degrees of freedom	Area to the right of the Critical Value									
	0.995	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	0.005
1	-----	-----	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.544	0.831	1.145	1.610	9.236	11.071	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.299
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.076	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.086	24.769	27.587	30.191	33.409	35.718
18	6.266	7.016	8.231	9.390	10.866	25.989	28.869	31.526	34.806	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997

degrees of freedom	Area to the right of the Critical Value									
	0.995	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	0.005
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.452	10.982	12.338	14.042	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.144	36.741	40.113	43.194	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.196	41.337	44.461	48.278	50.993
29	13.121	14.257	16.047	17.708	19.768	39.087	42.557	45.772	49.588	52.336
30	13.787	14.954	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.43	104.21
80	51.172	53.540	57.153	60.391	64.278	96.578	101.88	106.63	112.33	116.32
90	59.196	61.754	65.647	69.126	73.291	107.57	113.15	118.14	124.12	128.30
100	67.328	70.065	74.222	77.929	82.358	118.50	124.34	129.56	135.81	140.17

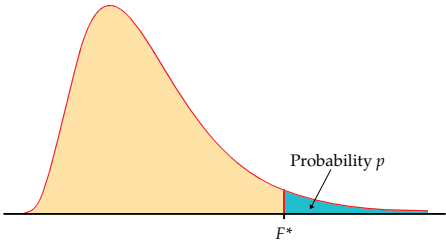


Table entry for  $p$  is the critical value  $F^*$  with probability  $p$  lying to its right.

TABLE E  
F critical values

		Degrees of freedom in the numerator								
$p$		1	2	3	4	5	6	7	8	9
1	.100	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86
	.050	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54
	.025	647.79	799.50	864.16	899.58	921.85	937.11	948.22	956.66	963.28
	.010	4052.2	4999.5	5403.4	5624.6	5763.6	5859.0	5928.4	5981.1	6022.5
	.005	4052.2	4999.5	5403.4	5624.6	5763.6	5859.0	5928.4	5981.1	6022.5
	.001	405284	500000	540379	562500	576405	585937	592873	598144	602284
2	.100	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38
	.050	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38
	.025	38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.37	39.39
	.010	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39
	.005	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39
	.001	998.50	999.00	999.17	999.25	999.30	999.33	999.36	999.37	999.39
3	.100	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24
	.050	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
	.025	17.44	16.04	15.44	15.10	14.88	14.73	14.62	14.54	14.47
	.010	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35
	.005	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35
	.001	167.03	148.50	141.11	137.10	134.58	132.85	131.58	130.62	129.86
4	.100	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94
	.050	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
	.025	12.22	10.65	9.98	9.60	9.36	9.20	9.07	8.98	8.90
	.010	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66
	.005	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66
	.001	74.14	61.25	56.18	53.44	51.71	50.53	49.66	49.00	48.47
5	.100	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32
	.050	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
	.025	10.01	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68
	.010	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16
	.005	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16
	.001	47.18	37.12	33.20	31.09	29.75	28.83	28.16	27.65	27.24
6	.100	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96
	.050	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
	.025	8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52
	.010	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98
	.005	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98
	.001	35.51	27.00	23.70	21.92	20.80	20.03	19.46	19.03	18.69
7	.100	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72
	.050	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
	.025	8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82
	.010	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72
	.005	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72
	.001	29.25	21.69	18.77	17.20	16.21	15.52	15.02	14.63	14.33

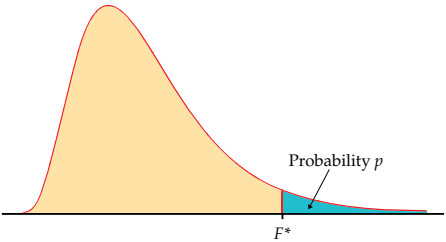


Table entry for  $p$  is the critical value  $F^*$  with probability  $p$  lying to its right.

TABLE E  
F critical values (continued)

Degrees of freedom in the numerator											
10	12	15	20	25	30	40	50	60	120	1000	
60.19	60.71	61.22	61.74	62.05	62.26	62.53	62.69	62.79	63.06	63.30	
241.88	243.91	245.95	248.01	249.26	250.10	251.14	251.77	252.20	253.25	254.19	
968.63	976.71	984.87	993.10	998.08	1001.4	1005.6	1008.1	1009.8	1014.0	1017.7	
6055.8	6106.3	6157.3	6208.7	6239.8	6260.6	6286.8	6302.5	6313.0	6339.4	6362.7	
605621	610668	615764	620908	624017	626099	628712	630285	631337	633972	636301	
9.39	9.41	9.42	9.44	9.45	9.46	9.47	9.47	9.47	9.48	9.49	
19.40	19.41	19.43	19.45	19.46	19.46	19.47	19.48	19.48	19.49	19.49	
39.40	39.41	39.43	39.45	39.46	39.46	39.47	39.48	39.48	39.49	39.50	
99.40	99.42	99.43	99.45	99.46	99.47	99.47	99.48	99.48	99.49	99.50	
999.40	999.42	999.43	999.45	999.46	999.47	999.47	999.48	999.48	999.49	999.50	
5.23	5.22	5.20	5.18	5.17	5.17	5.16	5.15	5.15	5.14	5.13	
8.79	8.74	8.70	8.66	8.63	8.62	8.59	8.58	8.57	8.55	8.53	
14.42	14.34	14.25	14.17	14.12	14.08	14.04	14.01	13.99	13.95	13.91	
27.23	27.05	26.87	26.69	26.58	26.50	26.41	26.35	26.32	26.22	26.14	
129.25	128.32	127.37	126.42	125.84	125.45	124.96	124.66	124.47	123.97	123.53	
3.92	3.90	3.87	3.84	3.83	3.82	3.80	3.80	3.79	3.78	3.76	
5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.70	5.69	5.66	5.63	
8.84	8.75	8.66	8.56	8.50	8.46	8.41	8.38	8.36	8.31	8.26	
14.55	14.37	14.20	14.02	13.91	13.84	13.75	13.69	13.65	13.56	13.47	
48.05	47.41	46.76	46.10	45.70	45.43	45.09	44.88	44.75	44.40	44.09	
3.30	3.27	3.24	3.21	3.19	3.17	3.16	3.15	3.14	3.12	3.11	
4.74	4.68	4.62	4.56	4.52	4.50	4.46	4.44	4.43	4.40	4.37	
6.62	6.52	6.43	6.33	6.27	6.23	6.18	6.14	6.12	6.07	6.02	
10.05	9.89	9.72	9.55	9.45	9.38	9.29	9.24	9.20	9.11	9.03	
26.92	26.42	25.91	25.39	25.08	24.87	24.60	24.44	24.33	24.06	23.82	
2.94	2.90	2.87	2.84	2.81	2.80	2.78	2.77	2.76	2.74	2.72	
4.06	4.00	3.94	3.87	3.83	3.81	3.77	3.75	3.74	3.70	3.67	
5.46	5.37	5.27	5.17	5.11	5.07	5.01	4.98	4.96	4.90	4.86	
7.87	7.72	7.56	7.40	7.30	7.23	7.14	7.09	7.06	6.97	6.89	
18.41	17.99	17.56	17.12	16.85	16.67	16.44	16.31	16.21	15.98	15.77	
2.70	2.67	2.63	2.59	2.57	2.56	2.54	2.52	2.51	2.49	2.47	
3.64	3.57	3.51	3.44	3.40	3.38	3.34	3.32	3.30	3.27	3.23	
4.76	4.67	4.57	4.47	4.40	4.36	4.31	4.28	4.25	4.20	4.15	
6.62	6.47	6.31	6.16	6.06	5.99	5.91	5.86	5.82	5.74	5.66	
14.08	13.71	13.32	12.93	12.69	12.53	12.33	12.20	12.12	11.91	11.72	

(Continued)

TABLE E										
F critical values (continued)										
		Degrees of freedom in the numerator								
p		1	2	3	4	5	6	7	8	9
8	.100	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56
	.050	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
	.025	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36
	.010	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91
	.001	25.41	18.49	15.83	14.39	13.48	12.86	12.40	12.05	11.77
9	.100	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44
	.050	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
	.025	7.21	5.71	5.08	4.72	4.48	4.32	4.20	4.10	4.03
	.010	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35
	.001	22.86	16.39	13.90	12.56	11.71	11.13	10.70	10.37	10.11
10	.100	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35
	.050	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
	.025	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78
	.010	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94
	.001	21.04	14.91	12.55	11.28	10.48	9.93	9.52	9.20	8.96
11	.100	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27
	.050	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90
	.025	6.72	5.26	4.63	4.28	4.04	3.88	3.76	3.66	3.59
	.010	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63
	.001	19.69	13.81	11.56	10.35	9.58	9.05	8.66	8.35	8.12
12	.100	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21
	.050	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80
	.025	6.55	5.10	4.47	4.12	3.89	3.73	3.61	3.51	3.44
	.010	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39
	.001	18.64	12.97	10.80	9.63	8.89	8.38	8.00	7.71	7.48
13	.100	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16
	.050	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71
	.025	6.41	4.97	4.35	4.00	3.77	3.60	3.48	3.39	3.31
	.010	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19
	.001	17.82	12.31	10.21	9.07	8.35	7.86	7.49	7.21	6.98
14	.100	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12
	.050	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
	.025	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.21
	.010	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03
	.001	17.14	11.78	9.73	8.62	7.92	7.44	7.08	6.80	6.58
15	.100	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09
	.050	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59
	.025	6.20	4.77	4.15	3.80	3.58	3.41	3.29	3.20	3.12
	.010	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89
	.001	16.59	11.34	9.34	8.25	7.57	7.09	6.74	6.47	6.26
16	.100	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06
	.050	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
	.025	6.12	4.69	4.08	3.73	3.50	3.34	3.22	3.12	3.05
	.010	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78
	.001	16.12	10.97	9.01	7.94	7.27	6.80	6.46	6.19	5.98
17	.100	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03
	.050	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49
	.025	6.04	4.62	4.01	3.66	3.44	3.28	3.16	3.06	2.98
	.010	8.40	6.11	5.19	4.67	4.34	4.10	3.93	3.79	3.68
	.001	15.72	10.66	8.73	7.68	7.02	6.56	6.22	5.96	5.75

TABLE E											
F critical values (continued)											
		Degrees of freedom in the numerator									
		10	12	15	20	25	30	40	50	60	1000
	.100	2.54	2.50	2.46	2.42	2.40	2.38	2.36	2.35	2.34	2.30
	.050	3.35	3.28	3.22	3.15	3.11	3.08	3.04	3.02	3.01	2.93
	.025	4.30	4.20	4.10	4.00	3.94	3.89	3.84	3.81	3.78	3.68
	.010	5.81	5.67	5.52	5.36	5.26	5.20	5.12	5.07	5.03	4.87
	.001	11.54	11.19	10.84	10.48	10.26	10.11	9.92	9.80	9.73	9.36
	.100	2.42	2.38	2.34	2.30	2.27	2.25	2.23	2.22	2.21	2.16
	.050	3.14	3.07	3.01	2.94	2.89	2.86	2.83	2.80	2.79	2.71
	.025	3.96	3.87	3.77	3.67	3.60	3.56	3.51	3.47	3.45	3.34
	.010	5.26	5.11	4.96	4.81	4.71	4.65	4.57	4.52	4.48	4.32
	.001	9.89	9.57	9.24	8.90	8.69	8.55	8.37	8.26	8.19	7.84
	.100	2.32	2.28	2.24	2.20	2.17	2.16	2.13	2.12	2.11	2.08
	.050	2.98	2.91	2.85	2.77	2.73	2.70	2.66	2.64	2.62	2.54
	.025	3.72	3.62	3.52	3.42	3.35	3.31	3.26	3.22	3.20	3.14
	.010	4.85	4.71	4.56	4.41	4.31	4.25	4.17	4.12	4.08	3.92
	.001	8.75	8.45	8.13	7.80	7.60	7.47	7.30	7.19	7.12	6.78
	.100	2.25	2.21	2.17	2.12	2.10	2.08	2.05	2.04	2.03	1.98
	.050	2.85	2.79	2.72	2.65	2.60	2.57	2.53	2.51	2.49	2.41
	.025	3.53	3.43	3.33	3.23	3.16	3.12	3.06	3.03	3.00	2.89
	.010	4.54	4.40	4.25	4.10	4.01	3.94	3.86	3.81	3.78	3.61
	.001	7.92	7.63	7.32	7.01	6.81	6.68	6.52	6.42	6.35	6.02
	.100	2.19	2.15	2.10	2.06	2.03	2.01	1.99	1.97	1.96	1.91
	.050	2.75	2.69	2.62	2.54	2.50	2.47	2.43	2.40	2.38	2.30
	.025	3.37	3.28	3.18	3.07	3.01	2.96	2.91	2.87	2.85	2.73
	.010	4.30	4.16	4.01	3.86	3.76	3.70	3.62	3.57	3.54	3.37
	.001	7.29	7.00	6.71	6.40	6.22	6.09	5.93	5.83	5.76	5.44
	.100	2.14	2.10	2.05	2.01	1.98	1.96	1.93	1.92	1.90	1.85
	.050	2.67	2.60	2.53	2.46	2.41	2.38	2.34	2.31	2.30	2.21
	.025	3.25	3.15	3.05	2.95	2.88	2.84	2.78	2.74	2.72	2.60
	.010	4.10	3.96	3.82	3.66	3.57	3.51	3.43	3.38	3.34	3.18
	.001	6.80	6.52	6.23	5.93	5.75	5.63	5.47	5.37	5.30	4.99
	.100	2.10	2.05	2.01	1.96	1.93	1.91	1.89	1.87	1.86	1.80
	.050	2.60	2.53	2.46	2.39	2.34	2.31	2.27	2.24	2.22	2.14
	.025	3.15	3.05	2.95	2.84	2.78	2.73	2.67	2.64	2.61	2.50
	.010	3.94	3.80	3.66	3.51	3.41	3.35	3.27	3.22	3.18	3.02
	.001	6.40	6.13	5.85	5.56	5.38	5.25	5.10	5.00	4.94	4.62
	.100	2.06	2.02	1.97	1.92	1.89	1.87	1.85	1.83	1.82	1.79
	.050	2.54	2.47	2.40	2.33	2.28	2.25	2.20	2.18	2.16	2.07
	.025	3.06	2.96	2.86	2.76	2.69	2.64	2.59	2.55	2.52	2.40
	.010	3.80	3.67	3.52	3.37	3.28	3.21	3.13	3.08	3.05	2.88
	.001	6.08	5.81	5.54	5.25	5.07	4.95	4.80	4.70	4.64	4.33
	.100	2.03	1.99	1.94	1.89	1.86	1.84	1.81	1.79	1.78	1.72
	.050	2.49	2.42	2.35	2.28	2.23	2.19	2.15	2.12	2.11	2.02
	.025	2.99	2.89	2.79	2.68	2.61	2.57	2.51	2.47	2.45	2.32
	.010	3.69	3.55	3.41	3.26	3.16	3.10	3.02	2.97	2.93	2.76
	.001	5.81	5.55	5.27	4.99	4.82	4.70	4.54	4.45	4.39	4.08
	.100	2.00	1.96	1.91	1.86	1.83	1.81	1.78	1.76	1.75	1.69
	.050	2.45	2.38	2.31	2.23	2.18	2.15	2.10	2.08	2.06	1.97
	.025	2.92	2.82	2.72	2.62	2.55	2.50	2.44	2.41	2.38	2.26
	.010	3.59	3.46	3.31	3.16	3.07	3.00	2.92	2.87	2.83	2.75
	.001	5.58	5.32	5.05	4.78	4.60	4.48	4.33	4.24	4.18	3.87

(Continued)

TABLE E										
F critical values (continued)										
		Degrees of freedom in the numerator								
p		1	2	3	4	5	6	7	8	9
Degrees of freedom in the denominator	18	.100	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04
		.050	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51
		.025	5.98	4.56	3.95	3.61	3.38	3.22	3.10	3.01
		.010	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71
		.001	15.38	10.39	8.49	7.46	6.81	6.35	6.02	5.76
	19	.100	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02
		.050	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48
		.025	5.92	4.51	3.90	3.56	3.33	3.17	3.05	2.96
		.010	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63
		.001	15.08	10.16	8.28	7.27	6.62	6.18	5.85	5.59
	20	.100	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00
		.050	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45
		.025	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91
		.010	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56
		.001	14.82	9.95	8.10	7.10	6.46	6.02	5.69	5.44
	21	.100	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98
		.050	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42
		.025	5.83	4.42	3.82	3.48	3.25	3.09	2.97	2.87
		.010	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51
		.001	14.59	9.77	7.94	6.95	6.32	5.88	5.56	5.31
	22	.100	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97
		.050	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40
		.025	5.79	4.38	3.78	3.44	3.22	3.05	2.93	2.84
		.010	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45
		.001	14.38	9.61	7.80	6.81	6.19	5.76	5.44	5.19
Degrees of freedom in the denominator	23	.100	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95
		.050	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37
		.025	5.75	4.35	3.75	3.41	3.18	3.02	2.90	2.81
		.010	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41
		.001	14.20	9.47	7.67	6.70	6.08	5.65	5.33	5.09
	24	.100	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94
		.050	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36
		.025	5.72	4.32	3.72	3.38	3.15	2.99	2.87	2.78
		.010	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36
		.001	14.03	9.34	7.55	6.59	5.98	5.55	5.23	4.99
	25	.100	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93
		.050	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34
		.025	5.69	4.29	3.69	3.35	3.13	2.97	2.85	2.75
		.010	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32
		.001	13.88	9.22	7.45	6.49	5.89	5.46	5.15	4.91
	26	.100	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92
		.050	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32
		.025	5.66	4.27	3.67	3.33	3.10	2.94	2.82	2.73
		.010	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29
		.001	13.74	9.12	7.36	6.41	5.80	5.38	5.07	4.83
	27	.100	2.90	2.51	2.30	2.17	2.07	2.00	1.95	1.91
		.050	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31
		.025	5.63	4.24	3.65	3.31	3.08	2.92	2.80	2.71
		.010	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26
		.001	13.61	9.02	7.27	6.33	5.73	5.31	5.00	4.76

TABLE E										
F critical values (continued)										
		Degrees of freedom in the numerator								
		10	12	15	20	25	30	40	50	60
Degrees of freedom in the denominator	10	1.98	1.93	1.89	1.84	1.80	1.78	1.75	1.74	1.72
		2.41	2.34	2.27	2.19	2.14	2.11	2.06	2.04	2.02
		2.87	2.77	2.67	2.56	2.49	2.44	2.38	2.35	2.32
		3.51	3.37	3.23	3.08	2.98	2.92	2.84	2.78	2.75
		5.39	5.13	4.87	4.59	4.42	4.30	4.15	4.06	4.00
	12	1.96	1.91	1.86	1.81	1.78	1.76	1.73	1.71	1.70
		2.38	2.31	2.23	2.16	2.11	2.07	2.03	2.00	1.98
		2.82	2.72	2.62	2.51	2.44	2.39	2.33	2.30	2.27
		3.43	3.30	3.15	3.00	2.91	2.84	2.76	2.71	2.67
		5.22	4.97	4.70	4.43	4.26	4.14	3.99	3.90	3.84
	15	1.94	1.89	1.84	1.79	1.76	1.74	1.71	1.69	1.68
		2.35	2.28	2.20	2.12	2.07	2.04	1.99	1.97	1.95
		2.77	2.68	2.57	2.46	2.40	2.35	2.29	2.25	2.22
		3.37	3.23	3.09	2.94	2.84	2.78	2.69	2.64	2.61
		5.08	4.82	4.56	4.29	4.12	4.00	3.86	3.77	3.70
	20	1.92	1.87	1.83	1.78	1.74	1.72	1.69	1.67	1.66
		2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.94	1.92
		2.73	2.64	2.53	2.42	2.36	2.31	2.25	2.21	2.18
		3.31	3.17	3.03	2.88	2.79	2.72	2.64	2.58	2.55
		4.95	4.70	4.44	4.17	4.00	3.88	3.74	3.64	3.58
	25	1.90	1.86	1.81	1.76	1.73	1.70	1.67	1.65	1.64
		2.30	2.23	2.15	2.07	2.02	1.98	1.94	1.91	1.89
		2.70	2.60	2.50	2.39	2.32	2.27	2.21	2.17	2.14
		3.26	3.12	2.98	2.83	2.73	2.67	2.58	2.53	2.50
		4.83	4.58	4.33	4.06	3.89	3.78	3.63	3.54	3.48
Degrees of freedom in the denominator	30	1.89	1.84	1.80	1.74	1.71	1.69	1.66	1.64	1.62
		2.27	2.20	2.13	2.05	2.00	1.96	1.91	1.88	1.86
		2.67	2.57	2.47	2.36	2.29	2.24	2.18	2.14	2.11
		3.21	3.07	2.93	2.78	2.69	2.62	2.54	2.48	2.45
		4.73	4.48	4.23	3.96	3.79	3.68	3.53	3.44	3.38
	40	1.88	1.83	1.78	1.73	1.70	1.67	1.64	1.62	1.61
		2.25	2.18	2.11	2.03	1.97	1.94	1.89	1.86	1.84
		2.64	2.54	2.44	2.33	2.26	2.21	2.15	2.11	2.08
		3.17	3.03	2.89	2.74	2.64	2.58	2.49	2.44	2.40
		4.64	4.39	4.14	3.87	3.71	3.59	3.45	3.36	3.29
	50	1.87	1.82	1.77	1.72	1.68	1.66	1.63	1.61	1.59
		2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.84	1.82
		2.61	2.51	2.41	2.30	2.23	2.18	2.12	2.08	2.05
		3.13	2.99	2.85	2.70	2.60	2.54	2.45	2.40	2.36
		4.56	4.31	4.06	3.79	3.63	3.52	3.37	3.28	3.22
	60	1.86	1.81	1.76	1.71	1.67	1.65	1.61	1.59	1.58
		2.22	2.15	2.07	1.99	1.94	1.90	1.85	1.82	1.80
		2.59	2.49	2.39	2.28	2.21	2.16	2.09	2.05	2.03
		3.09	2.96	2.81	2.66	2.57	2.50	2.42	2.36	2.33
		4.48	4.24	3.99	3.72	3.56	3.44	3.30	3.21	3.15
	100	1.85	1.80	1.75	1.70	1.66	1.64	1.60	1.58	1.57
		2.20	2.13	2.06	1.97	1.92	1.88	1.84	1.81	1.79
		2.57	2.47	2.36	2.25	2.18	2.13	2.07	2.03	2.00
		3.06	2.93	2.78	2.63	2.54	2.47	2.38	2.33	2.29
		4.41	4.17	3.92	3.66	3.49	3.38	3.23	3.14	3.08

(Continued)

TABLE E										
F critical values (continued)										
		Degrees of freedom in the numerator								
p		1	2	3	4	5	6	7	8	9
Degrees of freedom in the denominator	28	.100	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.87
		.050	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29
		.025	5.61	4.22	3.63	3.29	3.06	2.90	2.78	2.69
		.010	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23
		.001	13.50	8.93	7.19	6.25	5.66	5.24	4.93	4.50
	29	.100	2.89	2.50	2.28	2.15	2.06	1.99	1.93	1.89
		.050	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28
		.025	5.59	4.20	3.61	3.27	3.04	2.88	2.76	2.67
		.010	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20
		.001	13.39	8.85	7.12	6.19	5.59	5.18	4.87	4.45
	30	.100	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88
		.050	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27
		.025	5.57	4.18	3.59	3.25	3.03	2.87	2.75	2.65
		.010	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17
		.001	13.29	8.77	7.05	6.12	5.53	5.12	4.82	4.39
	40	.100	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83
		.050	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18
		.025	5.42	4.05	3.46	3.13	2.90	2.74	2.62	2.53
		.010	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99
		.001	12.61	8.25	6.59	5.70	5.13	4.73	4.44	4.21
	50	.100	2.81	2.41	2.20	2.06	1.97	1.90	1.84	1.80
		.050	4.03	3.18	2.79	2.56	2.40	2.29	2.13	2.07
		.025	5.34	3.97	3.39	3.05	2.83	2.67	2.55	2.46
		.010	7.17	5.06	4.20	3.72	3.41	3.19	3.02	2.89
		.001	12.22	7.96	6.34	5.46	4.90	4.51	4.22	4.00
	60	.100	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77
		.050	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10
		.025	5.29	3.93	3.34	3.01	2.79	2.63	2.51	2.41
		.010	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82
		.001	11.97	7.77	6.17	5.31	4.76	4.37	4.09	3.86
	100	.100	2.76	2.36	2.14	2.00	1.91	1.83	1.78	1.73
		.050	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03
		.025	5.18	3.83	3.25	2.92	2.70	2.54	2.42	2.32
		.010	6.90	4.82	3.98	3.51	3.21	2.99	2.82	2.69
		.001	11.50	7.41	5.86	5.02	4.48	4.11	3.83	3.61
	200	.100	2.73	2.33	2.11	1.97	1.88	1.80	1.75	1.70
		.050	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98
		.025	5.10	3.76	3.18	2.85	2.63	2.47	2.35	2.26
		.010	6.76	4.71	3.88	3.41	3.11	2.89	2.73	2.60
		.001	11.15	7.15	5.63	4.81	4.29	3.92	3.65	3.43
	1000	.100	2.71	2.31	2.09	1.95	1.85	1.78	1.72	1.68
		.050	3.85	3.00	2.61	2.38	2.22	2.11	2.02	1.95
		.025	5.04	3.70	3.13	2.80	2.58	2.42	2.30	2.20
		.010	6.66	4.63	3.80	3.34	3.04	2.82	2.66	2.53
		.001	10.89	6.96	5.46	4.65	4.14	3.78	3.51	3.30

TABLE E											
F critical values (continued)											
		Degrees of freedom in the numerator									
		10	12	15	20	25	30	40	50	60	100
		1.84	1.79	1.74	1.69	1.65	1.63	1.59	1.57	1.56	1.52
		2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.79	1.77	1.71
		2.55	2.45	2.34	2.23	2.16	2.11	2.05	2.01	1.98	1.91
		3.03	2.90	2.75	2.60	2.51	2.44	2.35	2.30	2.26	2.17
		4.35	4.11	3.86	3.60	3.43	3.32	3.18	3.09	3.02	2.86
		1.83	1.78	1.73	1.68	1.64	1.62	1.58	1.56	1.55	1.51
		2.18	2.10	2.03	1.94	1.89	1.85	1.81	1.77	1.75	1.70
		2.53	2.43	2.32	2.21	2.14	2.09	2.03	1.99	1.96	1.89
		3.00	2.87	2.73	2.57	2.48	2.41	2.33	2.27	2.23	2.14
		4.29	4.05	3.80	3.54	3.38	3.27	3.12	3.03	2.97	2.81
		1.82	1.77	1.72	1.67	1.63	1.61	1.57	1.55	1.54	1.50
		2.16	2.09	2.01	1.93	1.88	1.84	1.79	1.76	1.74	1.68
		2.51	2.41	2.31	2.20	2.12	2.07	2.01	1.97	1.94	1.87
		2.98	2.84	2.70	2.55	2.45	2.39	2.30	2.25	2.21	2.11
		4.24	4.00	3.75	3.49	3.33	3.22	3.07	2.98	2.92	2.76
		1.76	1.71	1.66	1.61	1.57	1.54	1.51	1.48	1.47	1.42
		2.08	2.00	1.92	1.84	1.78	1.74	1.69	1.66	1.64	1.58
		2.39	2.29	2.18	2.07	1.99	1.94	1.88	1.83	1.80	1.72
		2.80	2.66	2.52	2.37	2.27	2.20	2.11	2.06	2.02	1.92
		3.87	3.64	3.40	3.14	2.98	2.87	2.73	2.64	2.57	2.41
		1.73	1.68	1.63	1.57	1.53	1.50	1.46	1.44	1.42	1.38
		2.03	1.95	1.87	1.78	1.73	1.69	1.63	1.60	1.58	1.51
		2.32	2.22	2.11	1.99	1.92	1.87	1.80	1.75	1.72	1.64
		2.70	2.56	2.42	2.27	2.17	2.10	2.01	1.95	1.91	1.80
		3.67	3.44	3.20	2.95	2.79	2.68	2.53	2.44	2.38	2.21
		1.71	1.66	1.60	1.54	1.50	1.48	1.44	1.41	1.40	1.35
		1.99	1.92	1.84	1.75	1.69	1.65	1.59	1.56	1.53	1.47
		2.27	2.17	2.06	1.94	1.87	1.82	1.74	1.70	1.67	1.58
		2.63	2.50	2.35	2.20	2.10	2.03	1.94	1.88	1.84	1.73
		3.54	3.32	3.08	2.83	2.67	2.55	2.41	2.32	2.25	2.08
		1.66	1.61	1.56	1.49	1.45	1.42	1.38	1.35	1.34	1.28
		1.93	1.85	1.77	1.68	1.62	1.57	1.52	1.48	1.45	1.38
		2.18	2.08	1.97	1.85	1.77	1.71	1.64	1.59	1.56	1.46
		2.50	2.37	2.22	2.07	1.97	1.89	1.80	1.74	1.69	1.57
		3.30	3.07	2.84	2.59	2.43	2.32	2.17	2.08	2.01	1.83
		1.63	1.58	1.52	1.46	1.41	1.38	1.34	1.31	1.29	1.23
		1.88	1.80	1.72	1.62	1.56	1.52	1.46	1.41	1.39	1.30
		2.11	2.01	1.90	1.78	1.70	1.64	1.56	1.51	1.47	1.37
		2.41	2.27	2.13	1.97	1.87	1.79	1.69	1.63	1.58	1.45
		3.12	2.90	2.67	2.42	2.26	2.15	2.00	1.90	1.83	1.64
		1.61	1.55	1.49	1.43	1.38	1.35	1.30	1.27	1.25	1.18
		1.84	1.76	1.68	1.58	1.52	1.47	1.41	1.36	1.33	1.24
		2.06	1.96	1.85	1.72	1.64	1.58	1.50	1.45	1.41	1.29
		2.34	2.20	2.06	1.90	1.79	1.72	1.61	1.54	1.50	1.35
		2.99	2.77	2.54	2.30	2.14	2.02	1.87	1.77	1.69	1.49