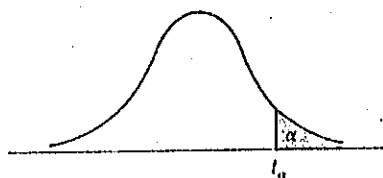


APPENDIX II USEFUL STATISTICAL TABLES

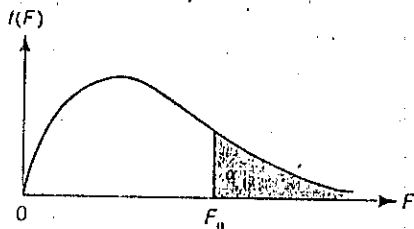
TABLE 2
Critical Values for
Student's *t*



DEGREES OF FREEDOM	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
∞	1.282	1.645	1.960	2.326	2.576

Source: From M. Morington, "Table of Percentage Points of the *t*-Distribution," *Biometrika*, 1941, 32, 300.
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TABLE 3 Critical Values for the F Statistic: F_{α}



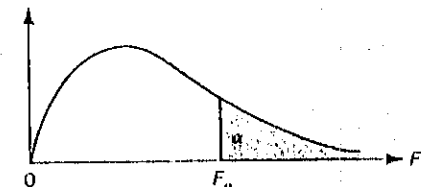
ν_2	ν_1	NUMERATOR DEGREES OF FREEDOM								
		1	2	3	4	5	6	7	8	9
1	1	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86
2	1	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38
3	1	5.64	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24
4	1	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94
5	1	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32
6	1	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96
7	1	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72
8	1	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56
9	1	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44
10	1	3.39	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35
11	1	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27
12	1	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21
13	1	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16
14	1	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12
15	1	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09
16	1	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06
17	1	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03
18	1	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	2.00
19	1	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98
20	1	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96
21	1	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95
22	1	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93
23	1	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95	1.92
24	1	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91
25	1	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93	1.89
26	1	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92	1.88
27	1	2.90	2.51	2.30	2.17	2.07	2.00	1.95	1.91	1.87
28	1	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.90	1.87
29	1	2.89	2.50	2.28	2.15	2.06	1.99	1.93	1.89	1.86
30	1	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85
40	1	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79
60	1	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74
120	1	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68
∞	1	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63

Source: From M. Merrington and C. M. Thompson, "Tables of Percentage Points of the Inverted Beta (F)-Distribution," *Biometrika*, 1943, 33, 73-88. Reproduced by permission of the *Biometrika* Trustees.

APPENDIX II USEFUL STATISTICAL TABLES

p_2	p_1	NUMERATOR DEGREES OF FREEDOM									
		10	12	15	20	24	30	40	60	120	∞
1		60.19	60.71	61.22	61.74	62.00	62.26	62.53	62.79	63.06	63.33
2		9.39	9.41	9.42	9.44	9.45	9.46	9.47	9.47	9.48	9.49
3		5.23	5.22	5.20	5.18	5.18	5.17	5.16	5.15	5.14	5.13
4		3.92	3.90	3.87	3.84	3.83	3.82	3.80	3.79	3.78	3.76
5		3.30	3.27	3.24	3.21	3.19	3.17	3.16	3.14	3.12	3.10
6		2.94	2.90	2.87	2.84	2.82	2.80	2.78	2.76	2.74	2.72
7		2.70	2.67	2.63	2.59	2.58	2.56	2.54	2.51	2.49	2.47
8		2.54	2.50	2.46	2.42	2.40	2.38	2.36	2.34	2.32	2.29
9		2.42	2.38	2.34	2.30	2.28	2.25	2.23	2.21	2.18	2.16
10		2.32	2.28	2.24	2.20	2.18	2.16	2.13	2.11	2.08	2.06
11		2.25	2.21	2.17	2.12	2.10	2.08	2.05	2.03	2.00	1.97
12		2.19	2.15	2.10	2.06	2.04	2.01	1.99	1.96	1.93	1.90
13		2.14	2.10	2.05	2.01	1.98	1.96	1.93	1.90	1.88	1.85
14		2.10	2.05	2.01	1.96	1.94	1.91	1.89	1.86	1.83	1.80
15		2.06	2.02	1.97	1.92	1.90	1.87	1.85	1.82	1.79	1.76
16		2.03	1.99	1.94	1.89	1.87	1.84	1.81	1.78	1.75	1.72
17		2.00	1.96	1.91	1.86	1.84	1.81	1.78	1.75	1.72	1.69
18		1.98	1.93	1.89	1.84	1.81	1.78	1.75	1.72	1.69	1.66
19		1.96	1.91	1.86	1.81	1.79	1.76	1.73	1.70	1.67	1.63
20		1.94	1.89	1.84	1.79	1.77	1.74	1.71	1.68	1.64	1.61
21		1.92	1.87	1.83	1.78	1.75	1.72	1.69	1.66	1.62	1.59
22		1.90	1.86	1.81	1.76	1.73	1.70	1.67	1.64	1.60	1.57
23		1.89	1.84	1.80	1.74	1.72	1.69	1.66	1.62	1.59	1.55
24		1.88	1.83	1.78	1.73	1.70	1.67	1.64	1.61	1.57	1.53
25		1.87	1.82	1.77	1.72	1.69	1.66	1.63	1.59	1.56	1.52
26		1.86	1.81	1.76	1.71	1.68	1.65	1.61	1.58	1.54	1.50
27		1.85	1.80	1.75	1.70	1.67	1.64	1.60	1.57	1.53	1.49
28		1.84	1.79	1.74	1.69	1.66	1.63	1.59	1.56	1.52	1.48
29		1.83	1.78	1.73	1.68	1.65	1.62	1.58	1.55	1.51	1.47
30		1.82	1.77	1.72	1.67	1.64	1.61	1.57	1.54	1.50	1.46
40		1.76	1.71	1.66	1.61	1.57	1.54	1.51	1.47	1.42	1.38
60		1.71	1.66	1.60	1.54	1.51	1.48	1.44	1.40	1.35	1.29
120		1.65	1.60	1.55	1.48	1.45	1.41	1.37	1.32	1.26	1.19
∞		1.60	1.55	1.49	1.42	1.38	1.34	1.30	1.24	1.17	1.00

TABLE 4 Critical Values for the F Statistic: F_{α}



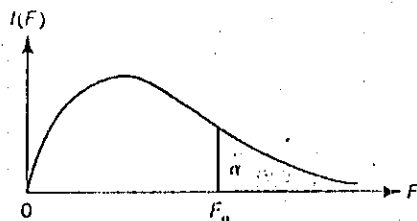
p_1 p_2	NUMERATOR DEGREES OF FREEDOM									
	1	2	3	4	5	6	7	8	9	
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	

Source: From M. Merrington and C. M. Thompson, "Tables of Percentage Points of the Inverted Beta (F)-Distribution," *Biometrika*, 1943, 33, 73-88. Reproduced by permission of the *Biometrika* Trustees.

APPENDIX II USEFUL STATISTICAL TABLES

F_{α}	NUMERATOR DEGREES OF FREEDOM									
	10	12	15	20	24	30	40	60	120	∞
1	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

DENOMINATOR DEGREES OF FREEDOM

TABLE 5 Critical Values for the F Statistic: F_{α} 

r_2	NUMERATOR DEGREES OF FREEDOM								
	1	2	3	4	5	6	7	8	9
1	4,052	4,999.5	5,403	5,625	5,764	5,859	5,928	5,982	6,022
2	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39
3	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35
4	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16
6	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98
7	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72
8	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91
9	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35
10	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.91
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19
14	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78
17	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60
19	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26
25	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22
26	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18
27	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15
28	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12
29	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56
∞	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41

Source: From M. Kerrington and G. M. Thompson, "Tables of Percentage Points of the Inverted Beta (F) Distribution," *Biometrika*, 1933, 31: 73-88. Reproduced by permission of the *Biometrika* Trustees.

APPENDIX II USEFUL STATISTICAL TABLES

ν_2	ν_1	NUMERATOR DEGREES OF FREEDOM									
		10	12	15	20	24	30	40	60	120	∞
	1	6,056	6,106	6,157	6,209	6,235	6,261	6,287	6,313	6,339	6,366
	2	99.40	99.42	99.43	99.45	99.46	99.47	99.47	99.48	99.49	99.50
	3	27.23	27.05	26.87	26.69	26.60	26.50	26.41	26.32	26.22	26.13
	4	14.55	14.37	14.20	14.02	13.93	13.84	13.75	13.65	13.56	13.46
	5	10.05	9.89	9.72	9.55	9.47	9.38	9.29	9.20	9.11	9.02
	6	7.87	7.72	7.56	7.40	7.31	7.23	7.14	7.06	6.97	6.88
	7	6.62	6.47	6.31	6.16	6.07	5.99	5.91	5.82	5.74	5.65
	8	5.81	5.67	5.52	5.36	5.28	5.20	5.12	5.03	4.95	4.86
	9	5.28	5.11	4.96	4.81	4.73	4.65	4.57	4.48	4.40	4.31
	10	4.85	4.71	4.56	4.41	4.33	4.25	4.17	4.08	4.00	3.91
	11	4.54	4.40	4.25	4.10	4.02	3.94	3.86	3.78	3.69	3.60
	12	4.30	4.16	4.01	3.86	3.78	3.70	3.62	3.54	3.45	3.36
	13	4.10	3.96	3.82	3.66	3.59	3.51	3.43	3.34	3.25	3.17
	14	3.94	3.80	3.66	3.51	3.43	3.35	3.27	3.18	3.09	3.00
	15	3.80	3.67	3.52	3.37	3.29	3.21	3.13	3.05	2.96	2.87
	16	3.69	3.55	3.41	3.26	3.18	3.10	3.02	2.93	2.84	2.75
	17	3.59	3.46	3.31	3.16	3.08	3.00	2.92	2.83	2.75	2.65
	18	3.51	3.37	3.23	3.08	3.00	2.92	2.84	2.75	2.66	2.57
	19	3.43	3.30	3.15	3.00	2.92	2.84	2.76	2.67	2.58	2.49
	20	3.37	3.23	3.09	2.94	2.86	2.78	2.69	2.61	2.52	2.42
	21	3.31	3.17	3.03	2.88	2.80	2.72	2.64	2.55	2.46	2.36
	22	3.26	3.12	2.98	2.83	2.75	2.67	2.58	2.50	2.40	2.31
	23	3.21	3.07	2.93	2.78	2.70	2.62	2.54	2.45	2.35	2.26
	24	3.17	3.03	2.89	2.74	2.66	2.58	2.49	2.40	2.31	2.21
	25	3.13	2.99	2.85	2.70	2.62	2.54	2.45	2.36	2.27	2.17
	26	3.09	2.96	2.81	2.66	2.58	2.50	2.42	2.33	2.23	2.13
	27	3.06	2.93	2.78	2.63	2.55	2.47	2.38	2.29	2.20	2.10
	28	3.03	2.90	2.75	2.60	2.52	2.44	2.35	2.26	2.17	2.06
	29	3.00	2.87	2.73	2.57	2.49	2.41	2.33	2.23	2.14	2.03
	30	2.98	2.84	2.70	2.55	2.47	2.39	2.30	2.21	2.11	2.01
	40	2.80	2.66	2.52	2.37	2.29	2.20	2.11	2.02	1.92	1.80
	60	2.63	2.50	2.35	2.20	2.12	2.03	1.94	1.84	1.73	1.60
	120	2.47	2.34	2.19	2.03	1.95	1.86	1.76	1.66	1.53	1.38
	∞	2.32	2.18	2.04	1.88	1.79	1.70	1.59	1.47	1.32	1.00

DENOMINATOR DEGREES OF FREEDOM