

Ex./SOC/PG/2.4/2018

MASTER OF ARTS EXAMINATION, 2018

(1st Year, 2nd Semester)

SOCIOLOGY

Social Statistics

Paper - (2.4)

Time : Two hours

Full Marks : 30

Attempt any *three* questions. 10x3=30

1. Answer any *two* questions : 5x2=10
 - (a) What do we mean when we say that the null hypothesis acts as a starting point ?
 - (b) What are the characteristics of the normal curve ?
What human behavior, trait. or characteristic can you think of is normally distributed ?
 - (c) Type I and Type II error.

2. (a) All sections of humanities at a large university were given the same final exam. Test scores were distributed normally, with a mean of 72 and a standard deviation of 8. What percentage of students scored between 60 and 69 (grade D) and what percentage scored between 70 and 79 (grade C) ? 8
- (b) What is a one-tailed test ? 2

(Turn Over)

(2)

3. (a) Mr. white wants to know whether his semester sociology students class average falls within the boundaries of the average score for the large group of students who have taken sociology over the past 20 years. Because he has kept good records he knows the means and the standard deviations for both his group of 36 students and the larger group of 1000 past enrollees. The data are :

Sample = 36

Mean 100

Standard Deviation = 5

Population = 1000

Population Mean = 99

Population Standard Deviation = 2.5

- (b) Interpret sociologically.

6+4

4. (a) Sociologists are long interested in the relationship between religious affiliation and political party affiliation. Traditionally Catholics have aligned themselves with Democratic Party, whereas Protestants were more likely to support Republican candidates. From the following study of 550 registered voters in California test whether Catholics are no more like than Protestants to affiliate with either party.

- (b) Interpret sociologically.

7+3

(3)

POLITICAL

AFFILIATION

RELIGIOUS AFFILIATION

	CATHOLIC	PROTESTANT	TOTAL
DEMOCRAT	125	225	350
REPUBLICAN	75	125	200
TOTAL	200	350	550

5. (a) Define nonparametric.
- (b) The following data show the scores obtained by a group of 20 students on a college entrance examination and a verbal comprehension test. What is the relationship between these two variables ? 2+8

Student	College entrance exam	verbal comprehension test
A	52	49
B	49	49
C	26	17
D	28	34
E	63	52
F	44	41
G	70	45
H	32	32

(Turn Over)

(4)

I	49	29
J	51	49
K	64	53
L	28	17
M	49	40
N	43	41
O	30	15
P	65	50
Q	35	28
R	60	55
S	49	37
T	66	50

6. (a) Surveys are typically pretested to identify procedural, sampling and wording problems. A telephone interview was pretested using 10 represents in a recent state wide survey of attitudes toward pornography. Calculate measures of central tendency for the variables.

(5)

RESPONDENT	AGE	SEX	ATTITUDE TOWARD PORNOGRAPHY
1	32	M	19
2	43	F	24
3	21	F	11
4	19	F	30
5	76	F	50
6	50	F	42
7	40	M	17
8	26	F	33
9	21	F	24
10	63	F	47

(b) Determine the level of measurement of each variable for each of the research situations :

(i) The administration of your university is proposing a change in parking policy. You select a random sample of students and ask each one of he or she favors or opposes the change.

(ii) A local automobile dealer is concerned about customer satisfaction. He wants to mail a survey form to all customers for the past year and ask them if they are satisfied, very satisfied with their purchases. 6+4

Appendix A

Area Under the Normal Curve

Column (a) lists Z scores from 0.00 to 4.00. Only positive scores are displayed, but, since the normal curve is symmetrical, the areas for negative scores will be exactly the same as areas for positive scores. Column (b) lists the proportion of the total area between the Z score and the mean. Figure A.1 displays areas of this type. Column (c) lists the proportion of the area beyond the Z score, and Figure A.2 displays this type of area.

FIGURE A.1 Area Between Mean and Z

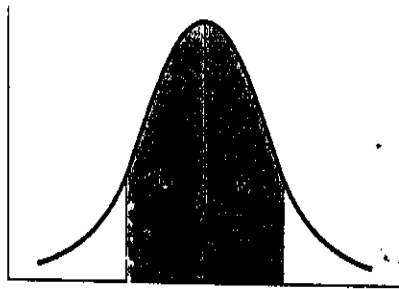
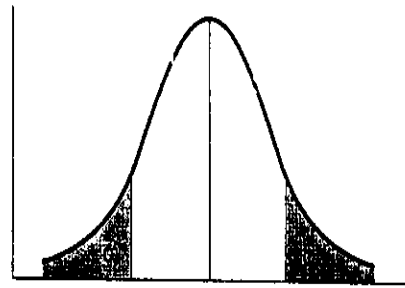


FIGURE A.2 Area Beyond Z



(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z
0.00	0.0000	0.5000
0.01	0.0040	0.4960
0.02	0.0080	0.4920
0.03	0.0120	0.4880
0.04	0.0160	0.4840
0.05	0.0199	0.4801
0.06	0.0239	0.4761
0.07	0.0279	0.4721
0.08	0.0319	0.4681
0.09	0.0359	0.4641
0.10	0.0398	0.4602
0.11	0.0438	0.4562
0.12	0.0478	0.4522
0.13	0.0517	0.4483
0.14	0.0557	0.4443
0.15	0.0596	0.4404
0.16	0.0636	0.4364
0.17	0.0675	0.4325
0.18	0.0714	0.4286
0.19	0.0753	0.4247
0.20	0.0793	0.4207

(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z
0.21	0.0832	0.4168
0.22	0.0871	0.4129
0.23	0.0910	0.4090
0.24	0.0948	0.4052
0.25	0.0987	0.4013
0.26	0.1026	0.3974
0.27	0.1064	0.3936
0.28	0.1103	0.3897
0.29	0.1141	0.3859
0.30	0.1179	0.3821
0.31	0.1217	0.3783
0.32	0.1255	0.3745
0.33	0.1293	0.3707
0.34	0.1331	0.3669
0.35	0.1368	0.3632
0.36	0.1406	0.3594
0.37	0.1443	0.3557
0.38	0.1480	0.3520
0.39	0.1517	0.3483
0.40	0.1554	0.3446

(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z	(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z
0.41	0.1591	0.3409	0.96	0.3315	0.1685
0.42	0.1628	0.3372	0.97	0.3340	0.1660
0.43	0.1664	0.3336	0.98	0.3365	0.1635
0.44	0.1700	0.3300	0.99	0.3389	0.1611
0.45	0.1736	0.3264	1.00	0.3413	0.1587
0.46	0.1772	0.3228	1.01	0.3438	0.1562
0.47	0.1808	0.3192	1.02	0.3461	0.1539
0.48	0.1844	0.3156	1.03	0.3485	0.1515
0.49	0.1879	0.3121	1.04	0.3508	0.1492
0.50	0.1915	0.3085	1.05	0.3531	0.1469
0.51	0.1950	0.3050	1.06	0.3554	0.1446
0.52	0.1985	0.3015	1.07	0.3577	0.1423
0.53	0.2019	0.2981	1.08	0.3599	0.1401
0.54	0.2054	0.2946	1.09	0.3621	0.1379
0.55	0.2088	0.2912	1.10	0.3643	0.1357
0.56	0.2123	0.2877	1.11	0.3665	0.1335
0.57	0.2157	0.2843	1.12	0.3686	0.1314
0.58	0.2190	0.2810	1.13	0.3708	0.1292
0.59	0.2224	0.2776	1.14	0.3729	0.1271
0.60	0.2257	0.2743	1.15	0.3749	0.1251
0.61	0.2291	0.2709	1.16	0.3770	0.1230
0.62	0.2324	0.2676	1.17	0.3790	0.1210
0.63	0.2357	0.2643	1.18	0.3810	0.1190
0.64	0.2389	0.2611	1.19	0.3830	0.1170
0.65	0.2422	0.2578	1.20	0.3849	0.1151
0.66	0.2454	0.2546	1.21	0.3869	0.1131
0.67	0.2486	0.2514	1.22	0.3888	0.1112
0.68	0.2517	0.2483	1.23	0.3907	0.1093
0.69	0.2549	0.2451	1.24	0.3925	0.1075
0.70	0.2580	0.2420	1.25	0.3944	0.1056
0.71	0.2611	0.2389	1.26	0.3962	0.1038
0.72	0.2642	0.2358	1.27	0.3980	0.1020
0.73	0.2673	0.2327	1.28	0.3997	0.1003
0.74	0.2703	0.2297	1.29	0.4015	0.0985
0.75	0.2734	0.2266	1.30	0.4032	0.0968
0.76	0.2764	0.2236	1.31	0.4049	0.0951
0.77	0.2794	0.2206	1.32	0.4066	0.0934
0.78	0.2823	0.2177	1.33	0.4082	0.0918
0.79	0.2852	0.2148	1.34	0.4099	0.0901
0.80	0.2881	0.2119	1.35	0.4115	0.0885
0.81	0.2910	0.2090	1.36	0.4131	0.0869
0.82	0.2939	0.2061	1.37	0.4147	0.0853
0.83	0.2967	0.2033	1.38	0.4162	0.0838
0.84	0.2995	0.2005	1.39	0.4177	0.0823
0.85	0.3023	0.1977	1.40	0.4192	0.0808
0.86	0.3051	0.1949	1.41	0.4207	0.0793
0.87	0.3078	0.1922	1.42	0.4222	0.0778
0.88	0.3106	0.1894	1.43	0.4236	0.0764
0.89	0.3133	0.1867	1.44	0.4251	0.0749
0.90	0.3159	0.1841	1.45	0.4265	0.0735
0.91	0.3186	0.1814	1.46	0.4279	0.0721
0.92	0.3212	0.1788	1.47	0.4292	0.0708
0.93	0.3238	0.1762	1.48	0.4306	0.0694
0.94	0.3264	0.1736	1.49	0.4319	0.0681
0.95	0.3289	0.1711	1.50	0.4332	0.0668

(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z	(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z
1.51	0.4345	0.0655	2.06	0.4803	0.0197
1.52	0.4357	0.0643	2.07	0.4808	0.0192
1.53	0.4370	0.0630	2.08	0.4812	0.0188
1.54	0.4382	0.0618	2.09	0.4817	0.0183
1.55	0.4394	0.0606	2.10	0.4821	0.0179
1.56	0.4406	0.0594	2.11	0.4826	0.0174
1.57	0.4418	0.0582	2.12	0.4830	0.0170
1.58	0.4429	0.0571	2.13	0.4834	0.0166
1.59	0.4441	0.0559	2.14	0.4838	0.0162
1.60	0.4452	0.0548	2.15	0.4842	0.0158
1.61	0.4463	0.0537	2.16	0.4846	0.0154
1.62	0.4474	0.0526	2.17	0.4850	0.0150
1.63	0.4484	0.0516	2.18	0.4854	0.0146
1.64	0.4495	0.0505	2.19	0.4857	0.0143
1.65	0.4505	0.0495	2.20	0.4861	0.0139
1.66	0.4515	0.0485	2.21	0.4864	0.0136
1.67	0.4525	0.0475	2.22	0.4868	0.0132
1.68	0.4535	0.0465	2.23	0.4871	0.0129
1.69	0.4545	0.0455	2.24	0.4875	0.0125
1.70	0.4554	0.0446	2.25	0.4878	0.0122
1.71	0.4564	0.0436	2.26	0.4881	0.0119
1.72	0.4573	0.0427	2.27	0.4884	0.0116
1.73	0.4582	0.0418	2.28	0.4887	0.0113
1.74	0.4591	0.0409	2.29	0.4890	0.0110
1.75	0.4599	0.0401	2.30	0.4893	0.0107
1.76	0.4608	0.0392	2.31	0.4896	0.0104
1.77	0.4616	0.0384	2.32	0.4898	0.0102
1.78	0.4625	0.0375	2.33	0.4901	0.0099
1.79	0.4633	0.0367	2.34	0.4904	0.0096
1.80	0.4641	0.0359	2.35	0.4906	0.0094
1.81	0.4649	0.0351	2.36	0.4909	0.0091
1.82	0.4656	0.0344	2.37	0.4911	0.0089
1.83	0.4664	0.0336	2.38	0.4913	0.0087
1.84	0.4671	0.0329	2.39	0.4916	0.0084
1.85	0.4678	0.0322	2.40	0.4918	0.0082
1.86	0.4686	0.0314	2.41	0.4920	0.0080
1.87	0.4693	0.0307	2.42	0.4922	0.0078
1.88	0.4699	0.0301	2.43	0.4925	0.0075
1.89	0.4706	0.0294	2.44	0.4927	0.0073
1.90	0.4713	0.0287	2.45	0.4929	0.0071
1.91	0.4719	0.0281	2.46	0.4931	0.0069
1.92	0.4726	0.0274	2.47	0.4932	0.0068
1.93	0.4732	0.0268	2.48	0.4934	0.0066
1.94	0.4738	0.0262	2.49	0.4936	0.0064
1.95	0.4744	0.0256	2.50	0.4938	0.0062
1.96	0.4750	0.0250	2.51	0.4940	0.0060
1.97	0.4756	0.0244	2.52	0.4941	0.0059
1.98	0.4761	0.0239	2.53	0.4943	0.0057
1.99	0.4767	0.0233	2.54	0.4945	0.0055
2.00	0.4772	0.0228	2.55	0.4946	0.0054
2.01	0.4778	0.0222	2.56	0.4948	0.0052
2.02	0.4783	0.0217	2.57	0.4949	0.0051
2.03	0.4788	0.0212	2.58	0.4951	0.0049
2.04	0.4793	0.0207	2.59	0.4952	0.0048
2.05	0.4798	0.0202	2.60	0.4953	0.0047

	(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z	(a) Z	(b) Area Between Mean and Z	(c) Area Beyond Z	
	2.61	0.4955	0.0045	3.11	0.4991	0.0009	
	2.62	0.4956	0.0044	3.12	0.4991	0.0009	
	2.63	0.4957	0.0043	3.13	0.4991	0.0009	
	2.64	0.4959	0.0041	3.14	0.4992	0.0008	
	2.65	0.4960	0.0040	3.15	0.4992	0.0008	
	2.66	0.4961	0.0039	3.16	0.4992	0.0008	
	2.67	0.4962	0.0038	3.17	0.4992	0.0008	
	2.68	0.4963	0.0037	3.18	0.4993	0.0007	
	2.69	0.4964	0.0036	3.19	0.4993	0.0007	
	2.70	0.4965	0.0035	3.20	0.4993	0.0007	
	2.71	0.4966	0.0034	3.21	0.4993	0.0007	
	2.72	0.4967	0.0033	3.22	0.4994	0.0006	
	2.73	0.4968	0.0032	3.23	0.4994	0.0006	
	2.74	0.4969	0.0031	3.24	0.4994	0.0006	
	2.75	0.4970	0.0030	3.25	0.4994	0.0006	
	2.76	0.4971	0.0029	3.26	0.4994	0.0006	
	2.77	0.4972	0.0028	3.27	0.4994	0.0006	
	2.78	0.4973	0.0027	3.28	0.4995	0.0005	
	2.79	0.4974	0.0026	3.29	0.4995	0.0005	
	2.80	0.4974	0.0026	3.30	0.4995	0.0005	
	2.81	0.4975	0.0025	3.31	0.4995	0.0005	
	2.82	0.4976	0.0024	3.32	0.4995	0.0005	
	2.83	0.4977	0.0023	3.33	0.4996	0.0004	
	2.84	0.4977	0.0023	3.34	0.4996	0.0004	
	2.85	0.4978	0.0022	3.35	0.4996	0.0004	
	2.86	0.4979	0.0021	3.35	0.4996	0.0004	
	2.87	0.4979	0.0021	3.37	0.4996	0.0004	
	2.88	0.4980	0.0020	3.38	0.4996	0.0004	
	2.89	0.4981	0.0019	3.39	0.4997	0.0003	
	2.90	0.4981	0.0019	3.40	0.4997	0.0003	
	2.91	0.4982	0.0018	3.41	0.4997	0.0003	
	2.92	0.4982	0.0018	3.42	0.4997	0.0003	
	2.93	0.4983	0.0017	3.43	0.4997	0.0003	
	2.94	0.4984	0.0016	3.44	0.4997	0.0003	
	2.95	0.4984	0.0016	3.45	0.4997	0.0003	
COMPR	2.96	0.4985	0.0015	3.46	0.4997	0.0003	SIVE
	2.97	0.4985	0.0015	3.47	0.4997	0.0003	
COMPR	2.98	0.4986	0.0014	3.48	0.4997	0.0003	SIVE
	2.99	0.4986	0.0014	3.49	0.4998	0.0003	
COMPR	3.00	0.4986	0.0014	3.50	0.4998	0.0002	SIVE
	3.01	0.4987	0.0013	3.50	0.4998	0.0002	
COMPR	3.02	0.4987	0.0013	3.50	0.4998	0.0002	SIVE
	3.03	0.4988	0.0012	3.70	0.4999	0.0001	
COMPR	3.04	0.4988	0.0012	3.70	0.4999	0.0001	SIVE
	3.05	0.4989	0.0011	3.80	0.4999	0.0001	
COMPR	3.06	0.4989	0.0011	3.80	0.4999	0.0001	SIVE
	3.07	0.4989	0.0011	3.90	0.4999	<0.0001	
COMPR	3.08	0.4989	0.0011	3.90	0.4999	<0.0001	SIVE
	3.09	0.4990	0.0010	4.00	0.4999	<0.0001	
COMPR	3.10	0.4990	0.0010	4.00	0.4999	<0.0001	SIVE
	3.10	0.4990	0.0010				

Distribution of t

Use this table to find the critical region (step 3 of the five-step model) for test of significance with sample means when sample size (N) is small. First, choose an alpha level and a one- or two-tailed test. Then find degrees of freedom to find the t score that marks the beginning of the critical region.

Degrees of Freedom	Level of Significance for One-Tailed Test					
	0.10	0.05	0.025	0.01	0.005	0.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

Source: Table III of Fisher and Yates: *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (1974), 6th edition (previously published by Oliver & Boyd Ltd., Edinburgh).

Appendix C

Distribution of Chi Square

Use this table to find the critical region (step 3 of the five-step model) for tests of significance with chi square. Choose an alpha level and find the degrees of freedom to find the chi square score that marks the beginning of the critical region.

	.99	.98	.95	.90	.85	.80	.75	.70	.65	.60	.55	.50	.45	.40	.35	.30	.25	.20	.15	.10	.05	.025	.01	.005	.001
1	.0157	.01628	.00393	.0158	.0642	.148	.455	1.074	1.642	2.706	3.841	5.412	6.635	10.827											
2	.0201	.0404	.103	.211	.446	.713	1.386	2.408	3.219	4.605	5.991	7.824	9.210	13.815											
3	.115	.185	.352	.584	1.005	1.424	2.366	3.665	4.642	6.251	7.815	9.837	11.341	16.268											
4	.297	.429	.711	1.064	1.649	2.195	3.357	4.878	5.939	7.779	9.488	11.668	13.277	18.465											
5	.554	.752	1.145	1.610	2.343	3.000	4.351	6.064	7.289	9.236	11.070	13.388	15.086	20.517											
6	.872	1.134	1.635	2.204	3.070	3.828	5.348	7.231	8.558	10.645	12.592	15.033	16.812	22.457											
7	1.239	1.564	2.167	2.833	3.822	4.671	6.346	8.383	9.803	12.017	14.067	16.622	18.475	24.322											
8	1.646	2.032	2.733	3.490	4.594	5.527	7.344	9.524	11.030	13.362	15.507	18.168	20.090	26.125											
9	2.088	2.532	3.325	4.168	5.380	6.393	8.343	10.656	12.242	14.684	16.919	19.679	21.666	27.877											
10	2.558	3.059	3.940	4.865	6.179	7.267	9.342	11.781	13.442	15.987	18.307	21.161	23.209	29.588											
11	3.053	3.609	4.575	5.578	6.989	8.148	10.341	12.899	14.631	17.275	19.675	22.618	24.725	31.264											
12	3.571	4.178	5.226	6.304	7.807	9.034	11.340	14.011	15.812	18.549	21.026	24.054	26.217	32.909											
13	4.107	4.765	5.892	7.042	8.634	9.926	12.340	15.119	16.985	19.812	22.362	25.472	27.688	34.528											
14	4.660	5.368	6.571	7.790	9.467	10.821	13.339	16.222	18.151	21.064	23.685	26.873	29.141	36.123											
15	5.229	5.985	7.261	8.547	10.307	11.721	14.339	17.322	19.311	22.307	24.996	28.259	30.578	37.697											
16	5.812	6.614	7.962	9.312	11.152	12.624	15.338	18.418	20.465	23.542	26.296	29.633	32.000	39.252											
17	6.408	7.255	8.672	10.085	12.002	13.531	16.338	19.511	21.615	24.769	27.587	30.995	33.409	40.790											
18	7.015	7.906	9.390	10.865	12.857	14.440	17.338	20.601	22.760	25.989	28.869	32.346	34.805	42.312											
19	7.633	8.567	10.117	11.651	13.716	15.352	18.338	21.689	23.900	27.204	30.144	33.687	36.191	43.820											
20	8.260	9.237	10.851	12.443	14.578	16.266	19.337	22.775	25.038	28.412	31.410	35.020	37.566	45.315											
21	8.897	9.915	11.591	13.240	15.445	17.182	20.337	23.858	26.171	29.615	32.671	36.343	38.932	46.797											
22	9.542	10.600	12.338	14.041	16.314	18.101	21.337	24.939	27.301	30.813	33.924	37.659	40.289	48.268											
23	10.196	11.293	13.091	14.848	17.187	19.021	22.337	26.018	28.429	32.007	35.172	38.968	41.638	49.728											
24	10.856	11.992	13.848	15.659	18.062	19.943	23.337	27.096	29.553	33.196	36.415	40.270	42.980	51.179											
25	11.524	12.697	14.611	16.473	18.940	20.867	24.337	28.172	30.675	34.382	37.652	41.566	44.314	52.620											
26	12.198	13.409	15.379	17.292	19.820	21.792	25.336	29.246	31.795	35.563	38.885	42.856	45.642	54.052											
27	12.879	14.125	16.151	18.114	20.703	22.719	26.336	30.319	32.912	36.741	40.113	44.140	46.963	55.476											
28	13.565	14.847	16.928	18.939	21.588	23.647	27.336	31.391	34.027	37.916	41.337	45.419	48.278	56.893											
29	14.256	15.574	17.708	19.768	22.475	24.577	28.336	32.461	35.139	39.087	42.557	46.693	49.588	58.302											
30	14.953	16.306	18.493	20.599	23.364	25.508	29.336	33.530	36.250	40.256	43.773	47.962	50.892	59.703											

Source: Table IV of Fisher and Yates: *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (1974), 6th edition (previously published by Oliver & Boyd Ltd., Edinburgh). Reprinted by permission of Addison Wesley Longman Ltd.

Distribution of F

Use this table to find the critical region (step 3 of the five-step model) for analysis of variance tests. Choose an alpha level of either 0.05 or 0.01 and then find the degrees of freedom to find the F ratio that marks the beginning of the critical region.

$p = .05$

1	161.4	199.5	215.7	224.6	230.2	234.0	238.9	243.9	249.0	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.37	19.41	19.45	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.84	8.74	8.64	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.04	5.91	5.77	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.82	4.68	4.53	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.15	4.00	3.84	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.73	3.57	3.41	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.44	3.28	3.12	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.23	3.07	2.90	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.07	2.91	2.74	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	2.95	2.79	2.61	2.40
12	4.75	3.88	3.49	3.26	3.11	3.00	2.85	2.69	2.50	2.30
13	4.67	3.80	3.41	3.18	3.02	2.92	2.77	2.60	2.42	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.70	2.53	2.35	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.64	2.48	2.29	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.59	2.42	2.24	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.55	2.38	2.19	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.51	2.34	2.15	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.48	2.31	2.11	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.45	2.28	2.08	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.42	2.25	2.05	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.40	2.23	2.03	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.38	2.20	2.00	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.36	2.18	1.98	1.73
25	4.24	3.38	2.99	2.76	2.60	2.49	2.34	2.16	1.96	1.71
26	4.22	3.37	2.98	2.74	2.59	2.47	2.32	2.15	1.95	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.30	2.13	1.93	1.67
28	4.20	3.34	2.95	2.71	2.56	2.44	2.29	2.12	1.91	1.65
29	4.18	3.33	2.93	2.70	2.54	2.43	2.28	2.10	1.90	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.27	2.09	1.89	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.18	2.00	1.79	1.51
60	4.00	3.15	2.76	2.52	2.37	2.25	2.10	1.92	1.70	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.02	1.83	1.61	1.25
∞	3.84	2.99	2.60	2.37	2.21	2.09	1.94	1.75	1.52	1.00

Values of n_1 and n_2 represent the degrees of freedom associated with the between and within estimates of variance, respectively.

Source: Table V of Fisher and Yates: *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (1974), 6th edition (previously published by Oliver and Boyd Ltd., Edinburgh). Reprinted by permission of Addison Wesley Longman Ltd.

$p = .01$

	4052	4999	5403	5625	5764	5859	5981	6106	6234	6366
1										
2	98.49	99.01	99.17	99.25	99.30	99.33	99.36	99.42	99.46	99.50
3	34.12	30.81	29.46	28.71	28.24	27.91	27.49	27.05	26.60	26.12
4	21.20	18.00	16.69	15.98	15.52	15.21	14.80	14.37	13.93	13.46
5	16.26	13.27	12.06	11.39	10.97	10.67	10.27	9.89	9.47	9.02
6	13.74	10.92	9.78	9.15	8.75	8.47	8.10	7.72	7.31	6.88
7	12.25	9.55	8.45	7.85	7.46	7.19	6.84	6.47	6.07	5.65
8	11.26	8.65	7.59	7.01	6.63	6.37	6.03	5.67	5.28	4.86
9	10.56	8.02	6.99	6.42	6.06	5.80	5.47	5.11	4.73	4.31
10	10.04	7.56	6.55	5.99	5.64	5.39	5.06	4.71	4.33	3.91
11	9.65	7.20	6.22	5.67	5.32	5.07	4.74	4.40	4.02	3.60
12	9.33	6.93	5.95	5.41	5.06	4.82	4.50	4.16	3.78	3.36
13	9.07	6.70	5.74	5.20	4.86	4.62	4.30	3.96	3.59	3.16
14	8.86	6.51	5.56	5.03	4.69	4.46	4.14	3.80	3.43	3.00
15	8.68	6.36	5.42	4.89	4.56	4.32	4.00	3.67	3.29	2.87
16	8.53	6.23	5.29	4.77	4.44	4.20	3.89	3.55	3.18	2.75
17	8.40	6.11	5.18	4.67	4.34	4.10	3.79	3.45	3.08	2.65
18	8.28	6.01	5.09	4.58	4.25	4.01	3.71	3.37	3.00	2.57
19	8.18	5.93	5.01	4.50	4.17	3.94	3.63	3.30	2.92	2.49
20	8.10	5.85	4.94	4.43	4.10	3.87	3.56	3.23	2.86	2.42
21	8.02	5.78	4.87	4.37	4.04	3.81	3.51	3.17	2.80	2.36
22	7.94	5.72	4.82	4.31	3.99	3.76	3.45	3.12	2.75	2.31
23	7.88	5.66	4.76	4.26	3.94	3.71	3.41	3.07	2.70	2.26
24	7.82	5.61	4.72	4.22	3.90	3.67	3.36	3.03	2.66	2.21
25	7.77	5.57	4.68	4.18	3.86	3.63	3.32	2.99	2.62	2.17
26	7.72	5.53	4.64	4.14	3.82	3.59	3.29	2.96	2.58	2.13
27	7.68	5.49	4.60	4.11	3.78	3.55	3.26	2.93	2.55	2.10
28	7.64	5.45	4.57	4.07	3.75	3.53	3.23	2.90	2.52	2.06
29	7.60	5.42	4.54	4.04	3.73	3.50	3.20	2.87	2.49	2.03
30	7.56	5.39	4.51	4.02	3.70	3.47	3.17	2.84	2.47	2.01
40	7.31	5.18	4.31	3.83	3.51	3.29	2.99	2.66	2.29	1.80
60	7.08	4.98	4.13	3.65	3.34	3.12	2.82	2.50	2.12	1.60
120	6.85	4.79	3.95	3.48	3.17	2.96	2.66	2.34	1.95	1.38
∞	6.64	4.60	3.78	3.32	3.02	2.80	2.51	2.18	1.79	1.00

Values of n_1 and n_2 represent the degrees of freedom associated with the between and within estimates of variance, respectively.

Distribution of F

Use this table to find the critical region (step 3 of the five-step model) for analysis of variance tests. Choose an alpha level of either 0.05 or 0.01 and then find the degrees of freedom to find the F ratio that marks the beginning of the critical region.

$p = .05$

1	161.4	199.5	215.7	224.6	230.2	234.0	238.9	243.9	249.0	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.37	19.41	19.45	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.84	8.74	8.64	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.04	5.91	5.77	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.82	4.68	4.53	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.15	4.00	3.84	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.73	3.57	3.41	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.44	3.28	3.12	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.23	3.07	2.90	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.07	2.91	2.74	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	2.95	2.79	2.61	2.40
12	4.75	3.88	3.49	3.26	3.11	3.00	2.85	2.69	2.50	2.30
13	4.67	3.80	3.41	3.18	3.02	2.92	2.77	2.60	2.42	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.70	2.53	2.35	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.64	2.48	2.29	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.59	2.42	2.24	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.55	2.38	2.19	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.51	2.34	2.15	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.48	2.31	2.11	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.45	2.28	2.08	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.42	2.25	2.05	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.40	2.23	2.03	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.38	2.20	2.00	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.36	2.18	1.98	1.73
25	4.24	3.38	2.99	2.76	2.60	2.49	2.34	2.16	1.96	1.71
26	4.22	3.37	2.98	2.74	2.59	2.47	2.32	2.15	1.95	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.30	2.13	1.93	1.67
28	4.20	3.34	2.95	2.71	2.56	2.44	2.29	2.12	1.91	1.65
29	4.18	3.33	2.93	2.70	2.54	2.43	2.28	2.10	1.90	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.27	2.09	1.89	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.18	2.00	1.79	1.51
60	4.00	3.15	2.76	2.52	2.37	2.25	2.10	1.92	1.70	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.02	1.83	1.61	1.25
∞	3.84	2.99	2.60	2.37	2.21	2.09	1.94	1.75	1.52	1.00

Values of n_1 and n_2 represent the degrees of freedom associated with the between and within estimates of variance, respectively.

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