FIJI NATIONAL UNIVERSITY

COLLEGE OF AGRICULTURE, FISHERIES & FORESTRY
SCHOOL OF AGRICULTURAL SCIENCES & FORESTRY

DEPARTMENT OF SOIL SCIENCE AND AGRICULTURAL ENGINEERING

BACHELOR OF SCIENCE IN AGRICULTURE – YEAR 1

AGS 511: AGRICULTURAL STATISTICS

FINAL EXAMINATION – SEMESTER 1, 2018

Time Allowed: 3 hours plus 10 minutes reading
Total marks: 100

INSTRUCTIONS

1. This paper consists of **three** sections and 12 pages.
2. Answer all questions in the answer booklet provided.
3. Make sure to indicate your **identification number** in all pages you use.
4. You can use permitted calculators.
5. Statistical Tables are attached with list of formulae.
6. This exam is worth 50% of your overall mark.

SECTION A	20 MULTIPLE CHOICE QUESTIONS	20 MARKS
SECTION B	PART I: 10 TRUE/FALSE QUESTIONS PART II: 10 FILL IN THE BLANKS PART III: 10 MATCHING	10 MARKS 10 MARKS 10 MARKS
SECTION C	5 LONG ANSWER QUESTIONS	50 MARKS

SECTION A: MULTIPLE CHOICE (20 MARKS)

This section consists of 20 multiple choice questions worth 1 mark each. Write the letter corresponding to the best answer in the Answer Booklet provided.

1. The 'number of dalo' in Koronivia Farm is an example of which type of variable?

   (A) a discrete variable
   (B) a continuous variable
   (C) a qualitative variable
   (D) none of the above

2. In which of the following statement, an inferential statistics have been used?

   (A) In the year 2010, 2500 students were enrolled in CAFF Koronivia.
   (B) 8 out 10 cabbage plants were without any pests.
   (C) Expenditures for FNU were $10.1 million in 1999.
   (D) Applying the new fertilizer to bean plants will increase yield by 7%.

3. A researcher divided subjects into groups according to variety of tomatoes and then selected 10 tomatoes from each group for her sample. What sampling method was the researcher using?

   (A) Cluster sampling
   (B) Stratified sampling
   (C) Simple Random sampling
   (D) Systematic sampling

4. Which of the following is an appropriate measure of central tendency for nominal data?

   (A) Mean (B) Median (C) Mode (D) Midrange

5. What are the boundaries of 2.0 – 2.5 metres?

   (A) 2.11 – 2.51 metres
   (B) 2.05 - 2.55 metres
   (C) 1.95 - 2.55 metres
   (D) 1.95 – 2.45 metres

6. What is the value of the mode when all values in the data set are different?

   (A) 0
   (B) 1
   (C) There is no mode.
   (D) It cannot be determined unless the data values are given.

7. Let X be the number of days per week that 30 AGS702 students do a 30 minute work on the Koronivia Farm.

X	Number of Students
0	3
1	2
2	3
3	8
4	1
5	9
6	4

Which of the following is the mean value?

(A) 5 (B) 8 (C) 3.5 (D) 4

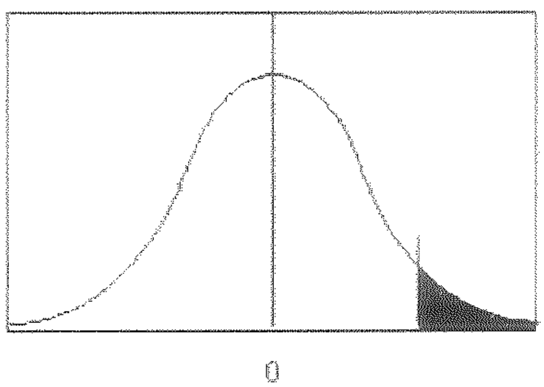
8. If the mode is to the left of the median and the mean is to the right of the median, then the distribution is:

(A) Right skewed.
(B) Left skewed.
(C) Symmetrical.
(D) Uniformed.

9. When the value of α is increased, the probability of committing a type I error is

(A) Decreased (B) Increased (C) The same (D) None of the above

10. Which type of alternative hypothesis is used in the figure below?



(A) $H_1: \mu = k$ (B) $H_1: \mu \neq k$ (C) $H_1: \mu > k$ (D) $H_1: \mu < k$

11. Which of the following is the appropriate null hypothesis if you wish to test the claim that the mean of the population is atleast 100?

(A) $\bar{X} = 100$ (B) $\mu \leq 100$ (C) $\mu \geq 100$ (D) $\mu \neq 100$

12. For the t-test, one uses ________ instead of σ.

(A) n (B) s (C) μ (D) $\bar{X}$

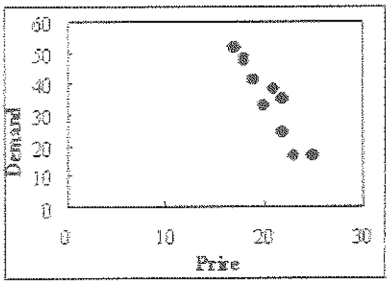
13. When the population standard deviation is unknown and the sample size is less than 30, what table value should be used in computing the test value for the hypothesis testing?

(A) z (B) t (C) χ^2 (D) F

14. In regression, the variable being predicted is usually referred to as the

(A) dependent variable.
(B) independent variable.
(C) coefficient of correlation.
(D) coefficient of determination.

15. The following scatter plot indicates



(A) strong positive correlation.
(B) no correlation.
(C) positive correlation.
(D) negative correlation.

16. Which of the following is the range for coefficient of determination?

(A) $0 < r^2 < 1$
(B) $-1 < r^2 < 1$
(C) $0 \leq r^2 \leq 1$
(D) $-1 \leq r^2 \leq 1$

17. In ANOVA, the null hypothesis should be rejected only

(A) when there is no difference among all pairs of means.
(B) when there is no difference among all pairs of variances.
(C) when there is a difference among all pairs of means.
(D) none of the above.

18. Determining the table value for the F-distribution is different from finding values in the t-distribution tables because the F-table requires _____ value/s for degrees of freedom.

(A) one (B) two (C) three (D) more than three

19. In experimental designs, a collection of plots is termed as

(A) experimental unit
(B) Plot
(C) block
(D) treatment

20. Assigning of treatments or factors to be tested to the experimental units according to definite laws or probability is technically known as

(A) Randomization
(B) Replication
(C) Local Control
(D) Experimentation

SECTION B: SHORT ANSWER QUESTIONS (30 MARKS)

Part I: True/False Questions (10 marks)

In the Answer Booklet provided write true or false for the following questions.

1. The variable temperature is an example of a quantitative variable.
2. The x-axis of a histogram is the midpoints.
3. In construction of a frequency polygon, the class limits are used for the x-axis.
4. When the mean is computed for individual data, all values in the data set are not used.
5. An outlier is an extremely high or extremely low value in a data set.
6. The positive square root of the variance is called standard deviation.
7. Type I error is committed when the null hypothesis is rejected when it is false.
8. The test value separates the rejection region from the acceptance region.
9. A correlation coefficient of -1 implies a strong positive linear relationship between the variables.
10. A negative relationship between two variables means that for the most part, as the x variable increases, the y variable decreases.

Part II: **Fill in the Blanks** **(10 marks)**

Fill in the blanks with (word or phrase or symbol or letter) the appropriate answer in the Answer Booklet.

1. A group of plants selected from the group of all plants under study is called a __________.
2. The three types of frequency distributions are ___________, Ungrouped and Grouped.
3. Picking every 10th cabbage plant from a plot for study would be an example of ______________ sampling.
4. Two major branches of statistics are Descriptive and ____________.
5. A measure obtained from sample data is called a sample ______________.
6. The symbol for population standard deviation is __________.
7. An extremely high or extremely low data value is called an ________________.
8. To test the claim that the mean is greater than 87, you would use a _____-tailed test.
9. The range of 'r' is from __________ to __________.
10. The symbol for population mean is __________.

Part III: **Matching** **(10 marks)**

Agricultural Statistics uses formulas with the associated names. Match the following names correctly with the formulas on the right.

1.	Ungrouped sample mean	A.	$\frac{\Sigma f(X-\mu)^2}{N}$
2.	Grouped Population mean	B.	$\frac{N+1}{2}$
3.	Grouped Sample variance	C.	$\frac{f}{N}$
4.	Ungrouped Population variance	D.	$\frac{\Sigma f X_m}{N}$
5.	Sample size	E.	$l+\frac{N/2-m}{f}\times c$

6.	Coefficient of Variation	F.	$\frac{\sum fX}{n}$
7.	Relative Frequency	G.	n
8.	Ungrouped median	H.	$n - 1$
9.	Grouped median	I.	$\frac{\sum f(X_m - \overline{X})^2}{n - 1}$
10.	Degree of freedom	J.	$\frac{s}{\overline{X}} \times 100$

SECTION C: LONG ANSWER QUESTIONS (50 MARKS)

This section consists of 5 long answer questions worth 10 marks each. Write your answers in the Answer Booklet provided. Show all necessary working as partial marks will be awarded to partially correct answers.

QUESTION 1 *Start on a new page* [4+4+2=10marks]

The following data give the test marks of 21 AGS511 students at FNU CAFF.

41	54	22	28	31	39	58
63	48	67	47	58	37	26
55	61	47	59	36	48	54

(i) Construct a frequency distribution table. Take 5 classes.
(ii) Construct a histogram and frequency polygon for the relative frequency distribution.
(iii) Construct an Ogive.

QUESTION 2 *Start on a new page* [2+2+2+2+1+1=10 marks]

A. A survey of 30 supermarkets reported these numbers of watermelon sales during a randomly selected year.

Number of watermelon sold	8-12	13-17	18-22	23-27	28-32	33-37
Frequency	1	4	10	5	4	6

Calculate the following:
(i) Mean.
(ii) Median.

(iii) Mode.

(iv) Variance.

(v) Standard Deviation.

(vi) Coefficient of Variation.

QUESTION 3 *Start on a new page* [5+5 =10 marks]

A. From a field of Co.33 paddy, a sample of 40 plants was selected at random. From these plants the panicle lengths were observed. The mean and standard deviation of these measurements were 18.7cm, and 1.25cm, respectively. Test at 5% level of significance whether the mean length of panicle of Co.33 paddy is atleast 19cm.

B. Ten dalo plants are chosen from a population at random whose heights in centimeters are given below:

52 55 57 61 64 65 67 68 70 71

At $\alpha = 0.1$, test the claim that the mean height of dalo plants is greater than 60 centimeters.

QUESTION 4 *Start on a new page* [3+2+3+2 = 10 marks]

A study was done to compare the plant height and leaf length of Taro grown under Gliricidia trees.

Plant height(cm), x	54	44	70	61	78	33	48	80	75	52
Leaf Length(cm), y	17	18	20	19	22	14	16	21	23	20

i. Compute and interpret the value of the correlation coefficient, r.

ii. Compute and interpret the value of the coefficient of determination, r^2.

iii. Find the equation for the regression line and use it to predict the plant height when leaf length is 25cm.

QUESTION 5 *Start on a new page* [10 marks]

A research group desired to compare the yield of different varieties of tomatoes from Koronivia Farm. Three different tomato varieties (namely Rising Sun No. 2, Melrose, Red Cherry) yield (in kg) was recorded as shown below. At 5% level of significance is there a sufficient evidence to conclude that a difference in yield exists? Use One-way ANOVA.

Rising Sun No.2	**Melrose**	**Red Cherry**
5.99	8.99	4.99
6.99	7.99	3.99
8.59	6.29	5.29
6.49	7.29	4.49

THE END

LIST OF FORMULAE:

1. $\overline{X} = \frac{\sum f.X_m}{n}$ and $s^2 = \frac{\sum f(X_m - \overline{X})^2}{n-1}$

2. $MD = l + \frac{N/_2 - m}{f} \times c$

3. $Mode = l + \frac{\Delta_1}{\Delta_1 + \Delta_2} \times c$

4. $r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \cdot \sqrt{n(\sum y^2) - (\sum y)^2}}$

5. The regression line $y' = a + bx$,

   where

   $$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2}$$

   $$b = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

6. $z = \frac{\overline{X} - \mu}{\sigma/\sqrt{n}}$

7. $t = \frac{\overline{X} - \mu}{s/\sqrt{n}}$

8. $S_B^2 = \frac{\sum n_i(\overline{X}_i - \overline{X}_{GM})^2}{k-1}$, $S_W^2 = \frac{\sum(n_i - 1)S_i^2}{\sum(n_i - 1)}$, $F = \frac{S_B^2}{S_W^2}$

TABLE 1: The t-Distribution Table

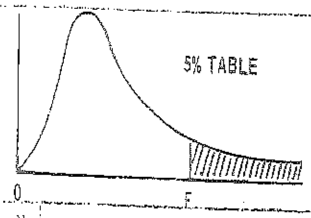
The entries in this table give the critical values of *t* for the specified number of degrees of freedom and areas in the right tail.

	Area in the Right Tail under the *t* Distribution Curve					
df	.10	.05	.025	.01	.005	.001
1	3.078	6.314	12.706	31.821	63.657	318.309
2	1.886	2.920	4.303	6.965	9.925	22.327
3	1.638	2.353	3.182	4.541	5.841	10.215
4	1.533	2.132	2.776	3.747	4.604	7.173
5	1.476	2.015	2.571	3.365	4.032	5.893
6	1.440	1.943	2.447	3.143	3.707	5.208
7	1.415	1.895	2.365	2.998	3.499	4.785
8	1.397	1.860	2.306	2.896	3.355	4.501
9	1.383	1.833	2.262	2.821	3.250	4.297
10	1.372	1.812	2.228	2.764	3.169	4.144
11	1.363	1.796	2.201	2.718	3.106	4.025
12	1.356	1.782	2.179	2.681	3.055	3.930
13	1.350	1.771	2.160	2.650	3.012	3.852
14	1.345	1.761	2.145	2.624	2.977	3.787
15	1.341	1.753	2.131	2.602	2.947	3.733
16	1.337	1.746	2.120	2.583	2.921	3.686
17	1.333	1.740	2.110	2.567	2.898	3.646
18	1.330	1.734	2.101	2.552	2.878	3.610
19	1.328	1.729	2.093	2.539	2.861	3.579
20	1.325	1.725	2.086	2.528	2.845	3.552
21	1.323	1.721	2.080	2.518	2.831	3.527
22	1.321	1.717	2.074	2.508	2.819	3.505
23	1.319	1.714	2.069	2.500	2.807	3.485
24	1.318	1.711	2.064	2.492	2.797	3.467
25	1.316	1.708	2.060	2.485	2.787	3.450
26	1.315	1.706	2.056	2.479	2.779	3.435
27	1.314	1.703	2.052	2.473	2.771	3.421
28	1.313	1.701	2.048	2.467	2.763	3.408
29	1.311	1.699	2.045	2.462	2.756	3.396
30	1.310	1.697	2.042	2.457	2.750	3.385
31	1.309	1.696	2.040	2.453	2.744	3.375
32	1.309	1.694	2.037	2.449	2.738	3.365
33	1.308	1.692	2.035	2.445	2.733	3.356
34	1.307	1.691	2.032	2.441	2.728	3.348
35	1.306	1.690	2.030	2.438	2.724	3.340

TABLE 2: Areas under Standard Normal Probability Curve (Source: Eton Table)

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359	4	8	12	16	20	24	28	32	36
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754	4	8	12	16	20	24	28	32	36
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141	4	8	12	15	19	22	27	31	35
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517	4	8	11	15	19	22	26	30	34
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879	4	7	11	14	18	22	25	29	32
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224	3	7	10	14	17	21	24	27	31
0.6	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549	3	6	10	13	16	19	23	26	29
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852	3	6	9	12	15	18	21	24	27
0.8	.2881	.2910	.2939	.2967	.2996	.3023	.3051	.3078	.3106	.3133	3	6	8	11	14	17	19	22	25
0.9	.3159	.3186	.3212	3238	.3264	.3289	.3315	.3340	.3365	.3389	3	5	8	10	13	15	18	20	23
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621	2	5	7	9	12	14	16	18	21
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830	2	4	6	8	10	12	14	16	19
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015	2	4	5	7	9	11	13	15	16
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177	2	3	5	6	8	10	11	13	14
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319	1	3	4	6	7	8	10	11	13
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441	1	2	4	5	6	7	8	10	11
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545	1	2	3	4	5	6	7	8	9
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633	1	2	3	3	4	5	6	7	8
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706	1	1	2	3	4	4	5	6	6
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767	1	1	2	2	3	4	4	5	5
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817	0	1	1	2	2	3	3	4	4
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857	0	1	1	2	2	2	3	3	4
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890	0	1	1	1	2	2	2	3	3
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916	0	0	1	1	1	2	2	2	2
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936	0	0	1	1	1	1	1	2	2
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952	0	0	0	1	1	1	1	1	1
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964	0	0	0	0	1	1	1	1	1
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974	0	0	0	0	0	1	1	1	1
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981	0	0	0	0	0	0	0	0	1
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986	0	0	0	0	0	0	0	0	1
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990	0	0	0	0	0	0	0	0	0
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993	0	0	0	0	0	0	0	0	0
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995	0	0	0	0	0	0	0	0	0
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997	0	0	0	0	0	0	0	0	0
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998	0	0	0	0	0	0	0	0	0
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	0	0	0	0	0	0	0	0	0
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	0	0	0	0	0	0	0	0	0
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	0	0	0	0	0	0	0	0	0
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	0	0	0	0	0	0	0	0	0
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	0	0	0	0	0	0	0	0	0

TABLE 3: F-DISTRIBUTION



5% TABLE

The tabulated value is the value of F with ν_1, ν_2 degrees of freedom which is exceeded with a probability of 5%. For other notes see 1% table

e.g. $P(F_{13,7} > 3.5108) = 5\%$.

ν_2 \ ν_1	1	2	3	4	5	6	7	8	9	10	12	15	20	30	60	∞
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.95	248.01	250.09	252.20	254.32
2	18.513	19.000	19.164	19.247	19.296	19.330	19.353	19.371	19.385	19.396	19.413	19.429	19.446	19.462	19.479	19.496
3	10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8868	8.8452	8.8123	8.7855	8.7446	8.7029	8.6602	8.6166	8.5720	8.5265
4	7.7086	6.9443	6.5914	6.3883	6.2560	6.1631	6.0942	6.0410	5.9988	5.9644	5.9117	5.8578	5.8025	5.7459	5.6878	5.6281
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725	4.7351	4.6777	4.6188	4.5581	4.4957	4.4314	4.3650
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2066	4.1468	4.0990	4.0600	3.9999	3.9381	3.8742	3.8082	3.7398	3.6688
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767	3.6365	3.5747	3.5108	3.4445	3.3758	3.3043	3.2298
8	5.3177	4.4590	4.0662	3.8378	3.6875	3.5806	3.5005	3.4381	3.3881	3.3472	3.2840	3.2184	3.1503	3.0794	3.0053	2.9276
9	5.1174	4.2565	3.8626	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789	3.1373	3.0729	3.0061	2.9365	2.8637	2.7872	2.7067
10	4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204	2.9782	2.9130	2.8450	2.7740	2.6996	2.6211	2.5379
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962	2.8536	2.7876	2.7186	2.6464	2.5705	2.4901	2.4045
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964	2.7534	2.6866	2.6169	2.5436	2.4663	2.3842	2.2962
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144	2.6710	2.6037	2.5331	2.4589	2.3803	2.2966	2.2064
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458	2.6021	2.5342	2.4630	2.3879	2.3082	2.2230	2.1307
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876	2.5437	2.4753	2.4035	2.3275	2.2468	2.1601	2.0658
16	4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377	2.4935	2.4247	2.3522	2.2756	2.1938	2.1058	2.0096
17	4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943	2.4499	2.3807	2.3077	2.2304	2.1477	2.0584	1.9604
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563	2.4117	2.3421	2.2686	2.1906	2.1071	2.0166	1.9168
19	4.3808	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227	2.3779	2.3080	2.2341	2.1555	2.0712	1.9796	1.8780
20	4.3513	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928	2.3479	2.2776	2.2033	2.1242	2.0391	1.9464	1.8432
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.3661	2.3210	2.2504	2.1757	2.0960	2.0102	1.9165	1.8117
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419	2.2967	2.2258	2.1508	2.0707	1.9842	1.8895	1.7831
23	4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201	2.2747	2.2036	2.1282	2.0476	1.9605	1.8649	1.7570
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002	2.2547	2.1834	2.1077	2.0267	1.9390	1.8424	1.7331
25	4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821	2.2365	2.1649	2.0889	2.0075	1.9192	1.8217	1.7110
26	4.2252	3.3690	2.9751	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655	2.2197	2.1479	2.0716	1.9898	1.9010	1.8027	1.6906
27	4.2100	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501	2.2043	2.1323	2.0558	1.9736	1.8842	1.7851	1.6717
28	4.1960	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.2360	2.1900	2.1179	2.0411	1.9586	1.8687	1.7689	1.6541
29	4.1830	3.3277	2.9340	2.7014	2.5454	2.4324	2.3463	2.2782	2.2229	2.1768	2.1045	2.0275	1.9446	1.8543	1.7537	1.6377
30	4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107	2.1646	2.0921	2.0148	1.9317	1.8409	1.7396	1.6223
40	4.0848	3.2317	2.8387	2.6060	2.4495	2.3359	2.2490	2.1802	2.1240	2.0772	2.0035	1.9245	1.8389	1.7444	1.6373	1.5089
60	4.0012	3.1504	2.7581	2.5252	2.3683	2.2540	2.1665	2.0970	2.0401	1.9926	1.9174	1.8364	1.7480	1.6491	1.5343	1.3893
120	3.9201	3.0718	2.6802	2.4472	2.2900	2.1750	2.0867	2.0164	1.9588	1.9105	1.8337	1.7505	1.6587	1.5543	1.4290	1.2539
∞	3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

F-DISTRIBUTION