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QUALIFICATION : BACHELOR OF SCIENCE IN AGRICULTURE & BACHELOR OF SCIENCE IN HORTICULTURE	
QUALIFICATION CODE: 07BAGA & 07BHOR	LEVEL: 5
COURSE: AGRICULTURAL STATISTICS	COURSE CODE: AGS520S
DATE: JULY 2025	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

#### SECOND OPPORTUNITY: QUESTION PAPER

**EXAMINER:** *Mr. Jonas Amunyela, Mr. Polykarp Amukuhu*

**MODERATOR:** *Mr. Andrew Roux*

#### INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

#### PERMISSIBLE MATERIALS:

1. Non-Programmable Calculator

#### ATTACHEMENTS

1. Z distribution Table
2. T distribution table
3. Chi-square table
4. Formula sheet

**This paper consists of 6 pages including this front page**

**QUESTION 1: MULTIPLE CHOICE QUESTIONS****[18 MARKS]**

Evaluate the statements in each numbered section and select the most appropriate answer

1.1 \_\_\_\_\_ produce outcomes that come from a counting process, e.g. the number of chickens present at the feeding area. [2]

- A.) Discrete random variable
- B.) Continuous random variable
- C.) Normal random variable
- D.) Nominal random variable
- E.) Ordinary random variable

1.2 \_\_\_\_\_ can be regarded as a nominal scale of measurement.

- A.) Types of soil [2]
- B.) Age of individuals
- C.) Weight of eggs
- D.) Number of livestock
- E.) None

1.3 When labels or names are being used to identify an attribute of each element, the researcher is considering a: [2]

- A.) Nominal scale of measurement
- B.) Ratio scales of measurement
- C.) Qualitative data
- D.) Quantitative data
- E.) Interval scales of measurement

1.4 If set A and B forms a partition of the sample space S, which of the following is true about set A and B? [2]

- a)  $P(A \cup B) = P(S)$
- b)  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- c)  $P(S) = 0$
- d)  $P(A \cap B) = P(A) + P(B)$

- 1.5 Mathematical probabilities can have values
- Between  $-1$  and  $1$  inclusive
  - Corresponding to any positive real number
  - Between  $0$  and  $1$  inclusive
  - Quotients of positive whole numbers or zero [2]
- 1.6 Supposed the events  $A$  and  $\bar{A}$  are two complementary events. Which of the following is not true about these two events?
- $P(A \cup \bar{A}) = P(S)$
  - $1 - P(A) = P(\bar{A})$
  - $P(A \cup \bar{A}) = 1$
  - $P(A \cup \bar{A}) \neq 1$  [2]
- 1.7 If you believe that the probability of purchasing a new tractor is dependent on getting a new higher paying job next year, the probability of purchasing the tractor is an example of:
- independent probability
  - Conditional probability
  - Joint probability
  - Subjective probability [2]
- 1.8 If the probabilities are respectively  $0.20$ ,  $0.25$  and  $0.38$  that a car stopped at a roadblock will have faulty brakes, badly worn tyres, faulty brakes and badly worn tyres. What is the probability that such a car will have faulty brakes or badly worn tyres? [2]
- $0.09$
  - $0.29$
  - $0.07$
  - $0.45$
- 1.9 Consider a bag containing  $15$  balls, of which  $9$  are green and  $6$  are white. In an experiment  $2$  balls are drawn in succession, white followed by green. [2]
- Let  $A = \{\text{event of drawing a white ball}\}$ , Let  $B = \{\text{event of drawing a green ball}\}$
- What is the probability of drawing both white balls?
- $\frac{1}{7}$
  - $\frac{2}{5}$
  - $\frac{5}{14}$
  - $\frac{9}{35}$

**SECTION B (Show all your working)**

**Question 2**

**[10 marks]**

2.1 State whether each of the following is quantitative or qualitative variable. If it is quantitative, state whether it is discrete or continuous.

- a. Your crop variety [2]
- b. The number of tomatoes harvested per hectare in the last 2 months. [2]
- c. The status of Foot-and-mouth disease (FMDV) in randomly selected farm animals [2]
- d. The weight of bags of dry beans from five different plots. [2]
- e. The soil types in 10 different plots [2]

**Question 3**

**(30 marks)**

3.1	123	138	127	148	152	161	155	131	176
	152	136	129	123	128	162	145	133	137

- 3.1.1 Determine the mode for the rainfall data. [2]
- 3.1.2 Group the data into a grouped frequency distribution with a lowest class lower limit of 120 mm and a class width of 10 mm. **(NB include classes, frequency and relative frequency)** [8]
- 3.1.3 What percentage of the rain fall was received between 120 mm to 130 mm? [1]
- 3.2 Cabbage is among the highest nitrates containing vegetarian food available in terms of quantity. The following table presents the distribution of nitrates in grams that was measured from 29 cabbages.

Nitrates contents (in grams)	Frequency
0-<9	4
9-<18	3
18-<27	9
27-<36	7
36-<45	6

- 3.2.1 Estimate the mean nitrate for the cabbages [3]
- 3.2.2 Estimate the median nitrate for the cabbages [3]
- 3.2.3 Estimate the mode nitrate for the cabbages [3]

- 3.3 Two thousand randomly selected farmers were asked whether they have ever shopped on the internet. The following table gives a two-way classification of the responses

	Have Shopped	Have never Shopped
Male	400	800
Female	350	450

If one farmer is selected at random from these 2000 farmers, find the probability that this farmer

- 3.3.1 has never shopped on the Internet [2]  
 3.3.2 is a male [2]  
 3.3.3 is male or has shopped on the internet [2]  
 3.3.4 is female given that she has shopped on the internet [2]  
 3.3.5 is male or female [2]

**Question 4**

**(17 marks)**

- 4.1 It is assumed that a sampling error of no more than  $\pm 4$  is desired along with 90% confidence to determine a sample size appropriate to estimate the mean weights of chicken eggs. Past data indicated that the standard deviations of the weight have been approximately 22Kg for substantial period.

Calculate the sample size needed [3]

- 4.2 An animal Farmer found that the sample average life of 30 specific blend of goats tested was 10 years. The population standard deviation is known to be 5 years.

- 4.2.1 Construct and interpret a 90% confidence interval estimate for the true mean life of all goats [6]

- 4.3 An analytical chemistry lab is conducting quality control tests on a drug. A single dosage of the drug should contain 8 mg of active ingredient. Of course, there will be a small amount of variability due to imperfections in the production process, but the mean of all dosages produced should be 8 mg. In 20 random dosages, the mean amount of active ingredient is 7.7 mg with a standard deviation of 1.03 mg. Do the

data suggest that the mean amount of active ingredient in all dosages produced is different from 8 mg? use  $\alpha = 0.05$  [8]

**QUESTION 5** (25 marks)

5.4 A certain farm owner buys a particular battery for his tractor. He decides to stop buying them if the mean life of these batteries is less than 24 months. A random sample of 9 batteries yielded a mean life of 22 months with a standard deviation of 3 months.

Test whether the farm owner should stop buying these batteries using a 10% level of significance. [8]

5.5 The table below shows the heights (in meters) of a random sample of seven lemon trees in Herta's Garden.

Trees	A	B	C	D	E	F	G
Height	1.05	0.99	1.2	1.1	1.5	0.98	0.95

5.5.1 Estimate the variance of the entire population of lemon trees in Herta's Garden with a 99% degree of confidence. [8]

5.5.2 Herta decides to continue growing lemon trees in her garden if the population variance for the heights of these trees is more than 1.05 meters.

Should Herta continue growing lemons? Use 5% level of significance. [9]

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**END OF QUESTION PAPER**

## FORMULA SHEET

$$M_e = L + \frac{c[0.5n - CF]}{f_{me}}$$

$$M_0 = L + \frac{c[f_m - f_{m-1}]}{2f_m - f_{m-1} - f_{m+1}}$$

$$\bar{x} = \frac{\sum fx}{n}$$

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

$$\bar{x} \pm Z_{\frac{\alpha}{2}} \left( \frac{\sigma}{\sqrt{n}} \right)$$

$$(p_1 - p_2) \pm Z_{\frac{\alpha}{2}} \left( \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}} \right)$$

$$t_{stat} = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

$$\frac{(n-1)S^2}{\chi^2_{\frac{\alpha}{2}, n-1}} < \sigma^2 < \frac{(n-1)S^2}{\chi^2_{1-\frac{\alpha}{2}, n-1}}$$

$$\chi^2_{stat} = \frac{(n-1)S^2}{\sigma^2}$$

$$\chi^2_{stat} = \sum \frac{(f_o - f_e)^2}{f_e}$$

$$E(X) = \sum x_i p_i$$

$$V(X) = \sum (x_i - \mu)^2 p(x_i)$$

$$P(X = x) = \binom{n}{x} p^x q^{n-x}$$

$$n = \frac{z^2(\sigma^2)}{E^2}$$

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

$$a = \bar{y} - b\bar{x}$$

$$\bar{\pi} = \frac{x_1 + x_2}{n_1 + n_2}$$

$$Z_{cal} = \frac{(p_1 - p_2) - (\pi_1 - \pi_2)}{\sqrt{\bar{\pi}(1-\bar{\pi}) \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$\bar{x} = \frac{\sum x}{n}$$

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

$$n = \frac{z^2 p(1-p)}{E^2}$$

$$s^2 = \frac{\sum (x_i - \bar{x})^2 f_i}{n-1}$$

$$p \pm z \sqrt{\frac{pq}{n}}$$

$$\bar{x} \pm t_{\frac{\alpha}{2}, n-1} \left( \frac{s}{\sqrt{n}} \right)$$

$$Z = \frac{x - \mu}{\sigma}$$

$$(\bar{x}_A - \bar{x}_B) \pm t \sqrt{\frac{s_A^2}{n_A} + \frac{s_B^2}{n_B}}$$

$$P(X = k) = \frac{e^{-\theta} \theta^x}{x!}$$

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$



## Z - Table

The table shows cumulative probabilities for the standard normal curve.

Cumulative probabilities for **NEGATIVE** z-values are shown first. **SCROLL DOWN** to the 2<sup>nd</sup> page for **POSITIVE** z

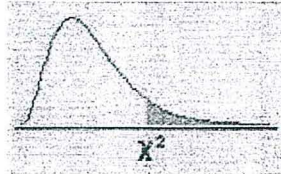
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

**TABLE of CRITICAL VALUES for STUDENT'S *t* DISTRIBUTIONS**

Column headings denote probabilities ( $\alpha$ ) above tabulated values.

d.f.	0.40	0.25	0.10	0.05	0.04	0.025	0.02	0.01	0.005	0.0025	0.001	0.0005
1	0.325	1.000	3.078	6.314	7.916	12.706	15.894	31.821	63.656	127.321	318.289	636.578
2	0.289	0.816	1.886	2.920	3.320	4.303	4.849	6.965	9.925	14.089	22.328	31.600
3	0.277	0.765	1.638	2.353	2.605	3.182	3.482	4.541	5.841	7.453	10.214	12.924
4	0.271	0.741	1.533	2.132	2.333	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	0.267	0.727	1.476	2.015	2.191	2.571	2.757	3.365	4.032	4.773	5.894	6.869
6	0.265	0.718	1.440	1.943	2.104	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.263	0.711	1.415	1.895	2.046	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.262	0.706	1.397	1.860	2.004	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.261	0.703	1.383	1.833	1.973	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	0.260	0.700	1.372	1.812	1.948	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.260	0.697	1.363	1.796	1.928	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.259	0.695	1.356	1.782	1.912	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	0.259	0.694	1.350	1.771	1.899	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	0.258	0.692	1.345	1.761	1.887	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	0.258	0.691	1.341	1.753	1.878	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.258	0.690	1.337	1.746	1.869	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	0.257	0.689	1.333	1.740	1.862	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	0.257	0.688	1.330	1.734	1.855	2.101	2.214	2.552	2.878	3.197	3.610	3.922
19	0.257	0.688	1.328	1.729	1.850	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.257	0.687	1.325	1.725	1.844	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	0.257	0.686	1.323	1.721	1.840	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	0.256	0.686	1.321	1.717	1.835	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	0.256	0.685	1.319	1.714	1.832	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	0.256	0.685	1.318	1.711	1.828	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	0.256	0.684	1.316	1.708	1.825	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	0.256	0.684	1.315	1.706	1.822	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	0.256	0.684	1.314	1.703	1.819	2.052	2.158	2.473	2.771	3.057	3.421	3.689
28	0.256	0.683	1.313	1.701	1.817	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	0.256	0.683	1.311	1.699	1.814	2.045	2.150	2.462	2.756	3.038	3.396	3.660
30	0.256	0.683	1.310	1.697	1.812	2.042	2.147	2.457	2.750	3.030	3.385	3.646
31	0.256	0.682	1.309	1.696	1.810	2.040	2.144	2.453	2.744	3.022	3.375	3.633
32	0.255	0.682	1.309	1.694	1.808	2.037	2.141	2.449	2.738	3.015	3.365	3.622
33	0.255	0.682	1.308	1.692	1.806	2.035	2.138	2.445	2.733	3.008	3.356	3.611
34	0.255	0.682	1.307	1.691	1.805	2.032	2.136	2.441	2.728	3.002	3.348	3.601
35	0.255	0.682	1.306	1.690	1.803	2.030	2.133	2.438	2.724	2.996	3.340	3.591
36	0.255	0.681	1.306	1.688	1.802	2.028	2.131	2.434	2.719	2.990	3.333	3.582
37	0.255	0.681	1.305	1.687	1.800	2.026	2.129	2.431	2.715	2.985	3.326	3.574
38	0.255	0.681	1.304	1.686	1.799	2.024	2.127	2.429	2.712	2.980	3.319	3.566
39	0.255	0.681	1.304	1.685	1.798	2.023	2.125	2.426	2.708	2.976	3.313	3.558
40	0.255	0.681	1.303	1.684	1.796	2.021	2.123	2.423	2.704	2.971	3.307	3.551
60	0.254	0.679	1.296	1.671	1.781	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	0.254	0.678	1.292	1.664	1.773	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	0.254	0.677	1.290	1.660	1.769	1.984	2.081	2.364	2.626	2.871	3.174	3.390
120	0.254	0.677	1.289	1.658	1.766	1.980	2.076	2.358	2.617	2.860	3.160	3.373
140	0.254	0.676	1.288	1.656	1.763	1.977	2.073	2.353	2.611	2.852	3.149	3.361
160	0.254	0.676	1.287	1.654	1.762	1.975	2.071	2.350	2.607	2.847	3.142	3.352
180	0.254	0.676	1.286	1.653	1.761	1.973	2.069	2.347	2.603	2.842	3.136	3.345
200	0.254	0.676	1.286	1.653	1.760	1.972	2.067	2.345	2.601	2.838	3.131	3.340
250	0.254	0.675	1.285	1.651	1.758	1.969	2.065	2.341	2.596	2.832	3.123	3.330
inf	0.253	0.674	1.282	1.645	1.751	1.960	2.054	2.326	2.576	2.807	3.090	3.290

## APPENDIX E: The Chi-Square Distribution



df/p	.995	.990	.975	.950	.900	.750	.500	.250	.100	.050	.025	.010	.005
1	0.00004	0.00016	0.00098	0.00393	0.01579	0.10153	0.45494	1.32330	2.70554	3.84146	5.02389	6.63490	7.87944
2	0.01003	0.02010	0.05064	0.10259	0.21072	0.57536	1.38629	2.77259	4.60517	5.99146	7.37776	9.21034	10.59663
3	0.07172	0.11483	0.21580	0.35185	0.58437	1.21253	2.36597	4.10834	6.25139	7.81473	9.34840	11.34487	12.83816
4	0.20699	0.29711	0.48442	0.71072	1.06362	1.92256	3.35669	5.38527	7.77944	9.48773	11.14329	13.27670	14.86026
5	0.41174	0.55430	0.83121	1.14548	1.61031	2.67460	4.35146	6.62568	9.23636	11.07050	12.83250	15.08627	16.74960
6	0.67573	0.87209	1.23734	1.63538	2.20413	3.45460	5.34812	7.84080	10.64464	12.59159	14.44938	16.81189	18.54758
7	0.98926	1.23904	1.68987	2.16735	2.83311	4.25485	6.34581	9.03715	12.01704	14.06714	16.01276	18.47531	20.27774
8	1.34441	1.64650	2.17973	2.73264	3.48954	5.07064	7.34412	10.21885	13.36157	15.50731	17.53455	20.09024	21.95495
9	1.73493	2.08790	2.70039	3.32511	4.16816	5.89883	8.34283	11.38875	14.68366	16.91898	19.02277	21.66599	23.58935
10	2.15586	2.55821	3.24697	3.94030	4.86518	6.73720	9.34182	12.54886	15.98718	18.30704	20.48318	23.20925	25.18818
11	2.60322	3.05348	3.81575	4.57481	5.57778	7.58414	10.34100	13.70069	17.27501	19.67514	21.92005	24.72497	26.75685
12	3.07382	3.57057	4.40379	5.22603	6.30380	8.43842	11.34032	14.84540	18.54935	21.02607	23.33666	26.21697	28.29952
13	3.56503	4.10692	5.00875	5.89186	7.04150	9.29907	12.33976	15.98391	19.81193	22.36203	24.73560	27.68825	29.81947
14	4.07467	4.66043	5.62873	6.57063	7.78953	10.16531	13.33927	17.11693	21.06414	23.68479	26.11895	29.14124	31.31935
15	4.60092	5.22935	6.26214	7.26094	8.54676	11.03654	14.33886	18.24509	22.30713	24.99579	27.48839	30.57791	32.80132
16	5.14221	5.81221	6.90766	7.96165	9.31224	11.91222	15.33850	19.36886	23.54183	26.29623	28.84535	31.99993	34.26719
17	5.69722	6.40776	7.56419	8.67176	10.08519	12.79193	16.33818	20.48868	24.76904	27.58711	30.19101	33.40866	35.71847
18	6.26480	7.01491	8.23075	9.39046	10.86494	13.67529	17.33790	21.60489	25.98942	28.86930	31.52638	34.80531	37.15645
19	6.84397	7.63273	8.90652	10.11701	11.65091	14.56200	18.33765	22.71781	27.20357	30.14353	32.85233	36.19087	38.58226
20	7.43384	8.26040	9.59078	10.85081	12.44261	15.45177	19.33743	23.82769	28.41198	31.41043	34.16961	37.56623	39.99685
21	8.03365	8.89720	10.28290	11.59131	13.23960	16.34438	20.33723	24.93478	29.61509	32.67057	35.47888	38.93217	41.40106
22	8.64272	9.54249	10.98232	12.33801	14.04149	17.23962	21.33704	26.03927	30.81328	33.92444	36.78071	40.28936	42.79565
23	9.26042	10.19572	11.68855	13.09051	14.84796	18.13730	22.33688	27.14134	32.00690	35.17246	38.07563	41.63840	44.18128
24	9.88623	10.85636	12.40115	13.84843	15.65868	19.03725	23.33673	28.24115	33.19624	36.41503	39.36408	42.97982	45.55851
25	10.51965	11.52398	13.11972	14.61141	16.47341	19.93934	24.33659	29.33885	34.38159	37.65248	40.64647	44.31410	46.92789
26	11.16024	12.19815	13.84390	15.37916	17.29188	20.84343	25.33646	30.43457	35.56317	38.88514	41.92317	45.64168	48.28988
27	11.80759	12.87850	14.57338	16.15140	18.11390	21.74940	26.33634	31.52841	36.74122	40.11327	43.19451	46.96294	49.64492
28	12.46134	13.56471	15.30786	16.92788	18.93924	22.65716	27.33623	32.62049	37.91592	41.33714	44.46079	48.27824	50.99338
29	13.12115	14.25645	16.04707	17.70837	19.76774	23.56659	28.33613	33.71091	39.08747	42.55697	45.72229	49.58788	52.33562
30	13.78672	14.95346	16.79077	18.49266	20.59923	24.47761	29.33603	34.79974	40.25602	43.77297	46.97924	50.89218	53.67196