NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION : BACHELOR OF AGRICULTURAL MANAGEMENT	
QUALIFICATION CODE: 07BAGR	**LEVEL:** 5
COURSE CODE: AGS520S	**COURSE NAME:** AGRICULTURAL STATISTICS
SESSION: JANUARY 2020	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MR. J Amunyela
MODERATOR:	MR.A.Roux

INSTRUCTIONS

1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.
4. Marks will not be awarded for answers obtained without showing the necessary steps leading to them (the answers).

ATTACHMENT: formula sheet, t-table, z-table, chi-square

PERMISSIBLE MATERIALS

1. Non-Programmable Calculator without the cover

THIS QUESTION PAPER CONSISTS OF _7_ PAGES (Including this front page)

SECTION A

QUESTION 1 [20 marks]

Write down the letter corresponding to your choice next to the question number.

1.1 The ________________is the extent to which all the data values group around a central value [2]

A. central tendency

B. subset of the population

C measure of variability

D variance

E. sample point in the population

1.2 Which of the following is a property of the mean?

A. Unique

B. not affected by outliers

C. there may be several means

D. it is the sum of all observation

E. All the above are measures of central tendency [2]

1.3 The ______________is the value of the middle observation in a dataset that has been ranked in increasing order. [2]

A. standard deviation

B. mode

C. range

D. mean

E. median

1.4 Which of the following is true about normal distribution? [2]

A. measures of dispersions are all equal

B. measures of central locations are all equal

C. the mean equals to the variance

D. parameters are equals to statistics

E. median equals to the variance

1.5 Which of the following is true in statistics? [2]

A. the mean is not part descriptive statistics

B. same dataset cannot have different modes

C. $\bar{x}$ is the same as μ when the sample is small or large

D. Two datasets with the same mean may have completely different spreads

E. none

1.6 Consider a random variable X with the following probability distribution

X	2	8	12	14	17
P(X)	0.10	0.20	0.15	x	0.15

1.6.1 The probability $P(X \leq 12)$ is: [2]

A. 0.10

B. 0.30

C. 0.45

D. 0.15

E. none

1.6.2 The value of x is [2]

A. 0.4

B. 6.3

C. 2.45

D. 1

E. none

1.7 Which of the following statement is not a possible application of a poison distribution: [2]

A. The number of cases of a disease in different farms in given time

B. The number of mutations in set sized regions of a chromosome

C. The number of particles emitted by a radioactive source each time

D. The number of births per hour during a given day

E. $V(X) = np$, for a poison random variable X

E. all the above

1.8 The narrower the confidence interval, [2]

A. the more precise it is

B. the less precise it is

C. the easier computations becomes

D. the larger the population

E. none

1.9 Consider $H_0: \mu \geq 55$ and $H_1: \mu < 55$. If we reject H_0 we conclude that: [2]

A. the population mean is less than 55

B. the population mean is more than 55

C. the population mean is equal to 55

D. the population mean is not equal to 55

E. all the above

SECTION B (Clearly show all your work)

Question 2 (33 marks)

2.1 Indicate whether the following statements are true (T) or false (F)

a. The two tailed hypotheses testing for the mean has only one rejection region [1]

b. The variable weight is an example of a continuous random variable [1]

c. If A is an event that a seed sown will germinate and B is an event that a seed sown will not germinate, then events A and B are mutual exclusive. [1]

d. The variable gender can be analysed as a nominal scale of measurement [1]

e. When performing a hypothesis testing for at least three means, we conduct a z-test. [1]

f. If $n = 10$, $\alpha = 5\%$ the t-critical value is 1.2034 for a two tailed test [1]

2.2 The following are the 400 soybean plant heights collected from a particular plot.

Plant height(Cms)	8-12	13-17	18-22	23-27	28-32	33-37	38-42	43-47
No. of plants (f_i)	6	17	25	86	125	77	55	9

2.2.1 Estimate the average height of soybean [4]

2.2.2 Estimate the median height of soybean [4]

2.2.2 Estimate the modal height of soybean [4]

2.2.3 Estimate the variance and standard deviation for the height of soybean [5]

2.3 In certain district the incidence of rinderpest disease in cattle was found to be 8% (or 0.8) in a dairy farm consisting of 10 animals. If the incidence of rinderpest is assumed to follow a binomial distribution, find

2.3.1 the average number of animals infected with the disease [2]

2.3.2 the probability that exactly two animals are infected with the disease [3]

2.3.3 the probability that at least 8 animals are infected [5]

QUESTION 3 [19 MARKS]

3.1 It is assumed that a sampling error of no more than ±3 is desired along with 95% confidence to determine a sample size appropriate to estimate the mean weights of lambs soon after birth for farm A. Past data indicated that the standard deviations of the weight have been approximately 2Kg for substantial period.

Calculate the sample size needed [3]

3.2 During December 2018, rainfall figures were recorded over 10 farms in the Khomas region and the following information were obtained. $s = 5.93, \bar{x} = 29.6$

a.) At the 5% level of significance test the hypothesis that the mean rainfall in Khomas is below 30mm. [8]

b.) Construct a 95% confidence interval to estimate the mean rainfall amount for the Khomas region. [6]

c. What assumption must be made to be sure that the confident interval in b) above is valid? [2]

QUESTION 4 [16 MARKS]

4.1 Suppose that we have the distribution of the yields (kg per plot) of two Ground nut varieties from 5 plots each. The distribution may be as follows:

Variety 1	46	48	50	52	54
Variety 2	30	40	25	60	70

4.1.1 Can the researcher conclude that the average Yield for variety 1 is more than that of variety 2? Use 5% significance level. [9]

4.1.2 Is this a two tail or single tail hypothesis [1]

4.1.3 Estimate a 95% confidence interval for the average difference in yields for the two variety. [6]

QUESTION 5 [12 MARKS]

5.1 The following data give the yield (in gm) from pigeonpea plants recorded over a period of five consecutive years (2014-2018).

Time(years)	2014	2015	2016	2017	2018
Yield	24.72	20.25	38.56	74.72	72.73

5.1.1 Fit by method of least squares a trend line equation for this dataset. (Use x =1,2...) [12]

***************************END OF QUESTION PAPER********************

FORMULA SHEET

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

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

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

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

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

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

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

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

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

$\chi^2_{stat} = \sum \frac{(f_0 - f_e)^2}{f_e}$

$E(X) = \sum x_i p_i$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\hat{Y} = a + bx$

$\bar{x} = \sum xp(x)$ and $V(X) = \sum (x_i - \bar{x})^2 \, p(x)$

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

Column headings denote probabilities (α) ***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

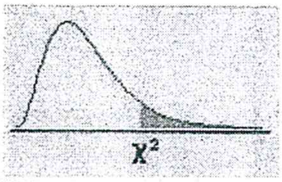
Z - Table

The table shows cumulative probabilities for the standard normal curve.

Cumulative probabilities for NEGATIVE z-values are shown first. SCROLL DOWN to the 2nd 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

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