CONFIDENTIAL

Infrastructure University Kuala Lumpur

SUNWAY INT'L BUSINESS SCHOOL

FINAL EXAMINATION
SEPTEMBER/OCTOBER SEMESTER 2019

INTRODUCTION TO STATISTICS
(STAT 1000)

(TIME: 3 HOURS)

MATRIC NO. : | | | | | | | | | |

IC. / PASSPORT NO. : | | | | | | | | | | | | | | |

LECTURER : **SHANTA RAYAMAJHI BASNET**

GENERAL INSTRUCTIONS

1. This question booklet consists of 11 printed pages including this page.
2. Answer **ALL questions** in the **ANSWER BOOKLET.**
3. **PLEASE DO NOT TURN THIS PAGE AND START THE EXAM UNTIL YOU ARE TOLD TO DO SO.**

INSTRUCTIONS **TIME: *3 HOURS***

SECTION A **(60 MARKS)**

There are SEVEN (7) questions in this section. Answer ALL Questions in the Answer Booklet.

1.

a) Define Statistics and write the importance of statistics in information technology.
(5 marks)

b) Indicate whether the following data set is a population or sample

i. A survey of 1353 American household found that 18% of the households own a computer.
(1 mark)

ii. A survey of each elementary school children found that 28% of the children could be classified as obese.
(1 mark)

c) Identify the type of the variable for the following statement:

i. The years the summer Olympics were held on the United States.
(1 mark)

ii. The rating of movie ranging from poor to good to excellent.
(1 mark)

iii. Hair colour of women on a high school tennis team.
(1 mark)

iv. The annual salaries for all lecturers in IUKL.
(1 mark)
(CLO1:PLO1: C2)

2. The following table shows the body mass (kg) of 40 students in a college

Body mass	30-40	40-50	50-60	60-70
No. of students	5	X	16	Y

a) Find the value of X if the degree of a pie-chart for second class is 108 degree.
(2 marks)

b) Obtain Y and the relative frequency of the fourth class.
(2 marks)

c) Draw a pie-chart to represent the above data.
(4 marks)
(CLO1:PLO1:C3)

3. The following data shows the ages of heart patients in a hospital

56	48	48	53	52	66	48	46	33	39	49	30
35	58	62	45	60	69	54	38	72	45	51	56
72	46	39	53	55	56	32	44	60	51	73	63
50	70	56	70								

a) By using 30 as the lower limit of the first class and 7 as the width of each class, construct a frequency distribution table.

(4 marks)

b) Draw a histogram hence estimates the mode by using mode.

(3 marks)

c) Draw a less than and more than ogives and estimate the median value to the one decimal point from the ogives.

(4 marks)
(CLO1:PLO1:C3)

4. An experiment was conducted by James Choi, David Laibson and Brigitte Madrian to study choices in fund section. Suppose 100 undergraduate students and 100 MBA students were selected. When presents with four S&P 500 Index funds that were identical except for their fees, undergraduate and MBA students chose the funds as follows

FUND	Student Group	
	Undergraduate	MBA
Lowest cost fund	19	19
Second –lowest cost fund	37	40
Third – lowest cost fund	17	23
Highest – cost fund	27	18

If a student is selected at random, what is the probability that he or she

a) selected the undergraduate students?

(1 mark)

b) selected the lowest or second lowest cost fund?

(2 marks)

c) selected the lowest cost fund and is an undergraduate?

(2 marks)

d) selected the lowest cost fund or is an undergraduate?

(2 marks)

e) Given that the student is an undergraduate, what is the probability that he or she selected the highest cost fund?

(2 marks)

f) Do you think undergraduate students and second lowest cost fund are independent events? Explain your answer.

(2 marks)
(CLO2: PLO2:C3)

5. Following are the marks secured by Mr.A and Mr.B in 10 tests of 50 marks each

Test	1	2	3	4	5	6	7	8	9	10
Marks Secured by A	24	37	27	30	31	34	36	26	29	33
Marks Secured by B	22	40	35	24	26	36	34	28	30	27

a) If the consistency of performance is the criteria for awarding a prize, who should be awarded by the prize?

(5 marks)

b) Who is better?

(2 marks)

c) Who is more intelligent?

(3 marks)
(CLO1:PLO1: C3)

6. According to the data from American Medical Association 15 % of US are left handed.

a) If 4 people are randomly selected

i) what is the probability that they are all left- handed?

(2 marks)

ii) what is the probability that at least one of them is left handed?

(2 marks)

b) If groups of 50 people are randomly selected

i) what is the mean number of left-handed people in such group?

(1 mark)

ii) what is the standard deviation for the numbers of left handed people in such groups?

(1 mark)

7. The quality control manager of certain company is inspecting batch of chocolate chip cookies that have just been baked. If the production process is in control, the average number of chip parts per cookies is 6. What is the probability that in any particular cookies being inspected,

   a) at most three chip parts will be found?

   (1.5 marks)

   b) none of the chip parts will be found?

   (1.5 marks)
   (CLO2:PLO4:C3)

SECTION B **(40 MARKS)**

There are THREE (3) questions in this section .Answer ANY TWO (2) questions in the Answer Booklet.

1.

a) The fill amount of bottles of a soft drink is normally distributed with a mean of 2.0 liters and standard deviation of 0.05. If you select a random sample of 25 bottles, what is the probability that the sample mean will be;

i. between 1.99 and 2.0 liters?

(3 marks)

ii. below 1.98 liters?

(2 marks)

iii. greater than 2.01 liters?

(2 marks)

iv. The probability is 99% that the sample mean amount of soft drink will be at least how much?

(3 marks)

v. The probability is 99% that the sample mean amount of soft drink will be between two values symmetrically distributed around the mean?

(3 marks)
(CLO2:PLO6:C3)

b) In a bolt factory machine A, B, C manufacturer 25%, 35%, 40% respectively, of the total of their output 5%, 4%, 2% are defective balls respectively. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine A?

(7 marks)
(CLO2: PLO2:C3)

2.

a) You are the manager of a restaurant that delivers pizza to college dormitory rooms. You have just changed your delivery process in an effort to reduce the mean time between the order and completion of delivery from the current 25 minutes. A sample of 36 orders using the new delivery process yields a sample mean of 22.4 minutes and standard deviation of 6 minutes.

i. State null and alternative hypotheses.

(3 marks)

ii. Using the six steps critical value approach, at the 5% level of significance, is there evidence that the population mean delivery time has been reduced below the previous population mean value of 25 minutes.

(9 marks)

b) The owner of a restaurant that serves continental food wants to study characteristics of his customers. He decides to focus on two variables: the amount of money spent by customers and whether customers order dessert. The results from sample of 40 customers are as follows:

Amount spent: $\bar{X} = \$15.3$, $S = \$3.8$

i. Construct a 95% confidence interval estimate of population mean amount spent her customer in the restaurant.

(4 marks)

ii. The owner of competing restaurant wants to conduct a similar survey in her restaurant. This owner doesn't have access to the information of the owner of the first restaurant. What sample size is needed to have 95%confidence of the estimating the population mean amount spent in her restaurant to within +_$2 assuming that the standard deviation is estimated to be $5?

(4 marks)
(CLO3:PLO6:C3)

3.

The table shows the information on CGPA and starting salaries (thousand) of seven recent university graduates.

CGPA	2.90	3.81	3.22	2.42	3.94	2.05	2.35
Starting Salary	28	38	25	35	40	25	28

a) Determine the independent variable and dependent variable for the above data. Do you expect a positive or negative relation between these two variables?

(2 marks)

b) Find the correlation coefficient for the given data.

(5 marks)

c) Calculate the coefficient of determination. Interpret your answer.

(2 marks)

d) Find the equation of the regression line for the data.

(6 marks)

e) Use the regression equation to predicate the value of starting salary when CGPA is 3.67. If the CGPA is not meaningful to predicate the value of starting salary, explain your answer.

(5 marks)
(CLO3:PLO6:C3)

***** END OF QUESTIONS *****

Student *t* Distribution

	Tail probability, p											
df	0.25	0.2	0.15	0.1	0.05	0.025	0.02	0.01	0.005	0.003	0.001	0.0005
1	1	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
2	0.816	1.061	1.386	1.886	2.92	4.303	4.849	6.965	9.925	14.09	22.33	31.6
3	0.765	0.978	1.25	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92
4	0.741	0.941	1.19	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.61
5	0.727	0.92	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	0.718	0.906	1.134	1.44	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.711	0.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.706	0.889	1.108	1.397	1.86	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.703	0.883	1.1	1.383	1.833	2.262	2.398	2.821	3.25	3.69	4.297	4.781
10	0.7	0.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.697	0.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.695	0.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.93	4.318
13	0.694	0.87	1.079	1.35	1.771	2.16	2.282	2.65	3.012	3.372	3.852	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.14
15	0.691	0.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.69	0.865	1.071	1.337	1.746	2.12	2.235	2.583	2.921	3.252	3.686	4.015
17	0.689	0.863	1.069	1.333	1.74	2.11	2.224	2.567	2.898	3.222	3.646	3.965
18	0.688	0.862	1.067	1.33	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	0.688	0.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.687	0.86	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.85
21	0.686	0.859	1.063	1.323	1.721	2.08	2.189	2.518	2.831	3.135	3.527	3.819
22	0.686	0.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	0.685	0.858	1.06	1.319	1.714	2.069	2.177	2.5	2.807	3.104	3.485	3.768
24	0.685	0.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	0.684	0.856	1.058	1.316	1.708	2.06	2.167	2.485	2.787	3.078	3.45	3.725
26	0.684	0.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	0.684	0.855	1.057	1.314	1.703	2.052	2.158	2.473	2.771	3.057	3.421	3.69
28	0.683	0.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	0.683	0.854	1.055	1.311	1.699	2.045	2.15	2.462	2.756	3.038	3.396	3.659
30	0.683	0.854	1.055	1.31	1.697	2.042	2.147	2.457	2.75	3.03	3.385	3.646
40	0.681	0.851	1.05	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	0.679	0.849	1.047	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	0.679	0.848	1.045	1.296	1.671	2	2.099	2.39	2.66	2.915	3.232	3.46
80	0.678	0.846	1.043	1.292	1.664	1.99	2.088	2.374	2.639	2.887	3.195	3.416
100	0.677	0.845	1.042	1.29	1.66	1.984	2.081	2.364	2.626	2.871	3.174	3.39
1000	0.675	0.842	1.037	1.282	1.646	1.962	2.056	2.33	2.581	2.813	3.098	3.3
∞	0.674	0.841	1.036	1.282	1.645	1.96	2.054	2.326	2.576	2.807	3.091	3.291

Z Scores

z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0	0.5000	0.504	0.5080	0.512	0.516	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.591	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.648	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.937	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

FORMULAE

1. $\bar{X} = \Sigma x / n$
2. $Z = \frac{\bar{X}-\mu}{\sigma}$
3. $X = \mu \pm Z.\sigma$
4. $\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}$
5. $Z = \frac{\bar{X}-\mu}{\frac{\sigma}{\sqrt{n}}}$
6. $t = \frac{\bar{X}-\mu}{\frac{\sigma}{\sqrt{n}}}$
7. μ= n*p
8. $Z = \frac{\hat{p}-p}{\sqrt{\frac{pq}{n}}}$
9. $\bar{X} \pm t_{\alpha/2} * \frac{\sigma}{\sqrt{n}}$
10. $\sigma_p = \sqrt{\frac{pq}{n}}$
11. $n = \frac{Z_{\frac{\alpha}{2}}^2 . \sigma^2}{e^2}$
12. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
13. $P(E_i/A) = \frac{P\left(\frac{A}{E_i}\right).P(E_i)}{P\left(\frac{A}{E_1}\right).P(E_1)+P\left(\frac{A}{E_2}\right).P(E_2)+\cdots\ldots+P\left(\frac{A}{E_n}\right).P(E_n)}$
17. $b_0 = \bar{Y} - b_1\bar{X}$
18. $b_1 = \frac{n\Sigma XY - \Sigma X \Sigma Y}{n\Sigma X^2 - (\Sigma X)^2}$
19. SST = SSR+SSE
20. $R = \frac{n\Sigma XY - \Sigma X.\Sigma Y}{\sqrt{n\Sigma X^2 - (\Sigma X)^2}.\sqrt{n\Sigma Y^2 - (\Sigma Y)^2}}$
21. $t = \frac{\hat{p}-p}{\sqrt{\frac{pq}{n}}}$
22. $R^2 = \frac{SSR}{SST}$
23. $\sigma = \sqrt{npq}$
24. $\bar{X} \pm Z_{\alpha/2} . \frac{\sigma}{\sqrt{n}}$
25. $\hat{p} \pm Z_{\alpha/2} * \sqrt{\frac{pq}{n}}$
28. $e = Z_{\alpha/2} * \frac{\sigma}{\sqrt{n}}$
29. $n = \left(\frac{Z_{\alpha/2} * \sigma}{e}\right)^2$
30. $P(A/B) = P(A \cap B)/P(B)$