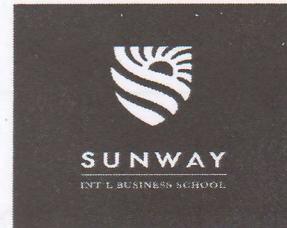


CONFIDENTIAL

INSTRUCTIONS



FINAL EXAMINATION SEPTEMBER/OCTOBER SEMESTER 2018

INTRODUCTION TO STATISTICS (STAT 1000)

(TIME : 3 HOURS)

MATRIC NO. :

IC. / PASSPORT NO. :

LECTURER : SHANTA RAYAMAJHI

GENERAL INSTRUCTIONS

1. This question booklet consists of 10 printed pages including this page.
2. Answer **ALL** questions for Section A in the **ANSWER BOOKLET**.
3. Answer **ANY TWO (2)** questions for Section B in the **ANSWER BOOKLET**.

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INSTRUCTIONS:**TIME: 3 HOURS****SECTION A****(60 MARKS)**

There are FIVE (5) questions in this section. Answer ALL Questions in the Answer Booklet.

1. A briefing session by a lead researcher to his research team was recorded as: "Our target respondents are families from a group of squatters who just moved into a new low cost house sponsor by state government. You should get cooperation from respondents to get information about: race, status of marriage, age at 1/1/2018, number of children, transportation to work, monthly gross income, agreement on the transfer program, satisfaction over new residence and other general information".

Based on the briefing session, determine the categorical and the numerical variables and classify its level of measurement. Hence, for each of the variable determined, give an example of response that may be obtained. (12 marks)

CLO1:PLO1:C2

2. The following are responses recorded from 100 squatter families about their level of agreement on a transfer program.

S	B	S	R	B	S	R	S	R	B	S	R	S	T	S	R	S	S	S	S
S	S	R	S	R	S	S	B	S	B	B	S	B	B	S	R	S	B	S	T
B	S	T	B	R	B	S	B	B	S	S	B	B	S	B	S	R	S	B	S
B	R	B	S	S	R	B	S	B	B	S	B	R	S	R	B	B	S	S	B
B	S	B	B	S	R	S	B	T	S	S	T	S	B	S	B	S	B	B	S

- a) Let S = Strongly Agree, B = Agree, R = Disagree and T = Strongly Disagree, construct a frequency table and draw a bar graph of the consent of the transfer program. (6 marks)

- b) Compute the sectarian angle for each level of agreement and draw a pie chart representing percentage of consent of the transfer program. (4 marks)

CLO1:PLO1:C3

3. Given the age (in years) of 12 heads of household which were selected at random.
- 45 48 40 50 35 60 55 59 52 38 62 65

Find the mean, the median and the inter-quartile range of age. Hence, construct a boxplot and comment on the skewness of age distribution. (14 marks)

CLO1:PLO1:C3

4. Study on families with 4 children was carried out to determine the number of children who never go to school.

- a) Draw a tree diagram to illustrate all possible outcomes. (3 marks)
- b) Set up a probability distribution of above study and find (3 marks)
- i. the probability of all children go to school. (1 mark)
 - ii. the probability of at least two children never go to school. (1 mark)
 - iii. the expected number of children who never go to school. (2 marks)

CLO2:PLO4:C3

5. a) According to police sources, a car with a certain protection system will be recovered 85% of the time. Find the probability that 5 of 7 stolen cars will be recovered. (2 marks)

- b) A sales firm receives an average of eight calls per hour on its toll-free number. For any given half an hour, find the probability that it will receive exactly nine calls. (3 marks)

- c) A car towing service company received an averages two calls per hour. Determine the probability that in a randomly selected hour the number of calls is no more than three. (3 marks)

- d) A ball manufacturer claims that only 15% of his balls are defective. If Ali has six of these balls to play with at a ball game, find the probability that at most four balls will be defective. (3 marks)

- e) Ali is expected to receive four emails in a week. Find the probability of receiving at least eight emails for the next 2 weeks. (3 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) In a given year, the average annual salary of a professional soccer players was \$189,000 with a standard deviation of \$20,500. If a sample of 50 players was taken, what is the probability that the mean of their salaries was more than \$192,000? (3 marks)
- b) In a certain statistics class, the marks obtained by students on a class test followed a normal distribution with a mean of 68% and a standard deviation of 10%. What is the probability that the mean test mark from a sample of 25 students from the class was at least 72%? (3 marks)
- c) The average daily temperature in a country during summer follows a normal distribution with a mean of 27°C and a standard deviation of 15°C . What is the probability that a randomly chosen sample of 10 summer days will have an average temperature of less than 28°C ? (3 marks)
- d) The lengths of pregnancies are normally distributed with a mean of 267 days and a standard deviation of 15 days. If 36 women are randomly selected, find the probability that they have a mean pregnancy between 267 days and 269 days. (3 marks)
- e) Assume that the heights of women are normally distributed with a mean of 63.6 inches and a standard deviation of 2.5 inches. If 100 women are randomly selected, find the probability that they have a mean height greater than 63.0 inches. (3 marks)
- f) Assume that the weights of factory workers are normally distributed with mean of 40 kg and a variance of 25 kg^2 . The probability that 50 randomly chosen workers have an average weight more than a certain average is 72%. What is the average weight of the factory worker? (5 marks)

CLO3:PLO6:C3

2. a) According to a certain TV broadcast station, the average number of violent incidents shown per episode of a TV series is 7. A researcher believes that this has increased in the last few years. A random sample of 16 recent episodes is selected which produced a sample mean of 7.5 violent incidents. Assume that the number of violent incidents follows a normal distribution and that the population standard deviation is 1.2. At $\alpha = 0.1$, conduct a hypothesis test in order to test whether the researcher's belief is accurate or not. (7 marks)

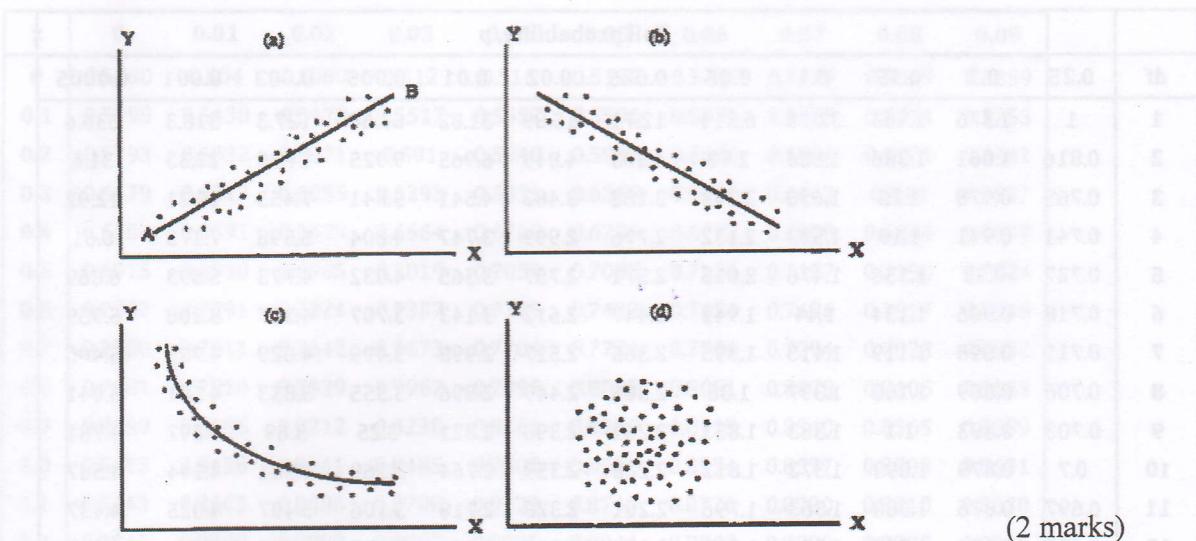
- b) A bank branch located in a commercial district of a city has developed an improved process for serving customer during peak lunch period. The waiting time (in minutes) of all customers during this period is recorded over a week. A sample of 10 customers is selected and the results are as follows:

4.21 5.55 3.02 5.13 4.77 2.34 3.54 3.20 4.50 0.38

- i. Calculate the mean and the standard deviation of customer waiting time. (5 marks)
 - ii. Determine degree of freedom, type of test and critical value at the 0.05 level of significance. (2 marks)
 - iii. Is there evidence to support that average waiting time is less than five minutes? (6 marks)

CLO3:PLO6:C3

3. a) State type of relationship for each of the following scatter plot.



(2 marks)

- b) A manager of sports shop believes that the customer's spending, Y (RM'000) per month depends on the income, X (RM'000). A study on seven customers gives the following results:

$$\sum x = 60, \sum y = 97, \sum x^2 = 548, \sum y^2 = 1403, \sum xy = 874$$

- i. Find the simple linear regression equation using the least squares method. Estimate the monthly spending of a customer if his income is RM25000. (12 marks)
- ii. How well does your regression equation truly represent your set of data? (4 marks)
- iii. Compute the value of correlation coefficient. Comment on the relationship from the value of r . (2 marks)

CLO3:PLO6:C3

*** END OF QUESTIONS ***

Student *t* Distribution

df	Tail probability, p											
	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

Negative Z Scores

z	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.0
-3.4	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
-3.3	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005
-3.2	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007
-3.1	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0010
-3.0	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013
-2.9	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019
-2.8	0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026
-2.7	0.0026	0.0027	0.0028	0.0029	0.0030	0.0031	0.0032	0.0033	0.0034	0.0035
-2.6	0.0036	0.0037	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044	0.0045	0.0047
-2.5	0.0048	0.0049	0.0051	0.0052	0.0054	0.0055	0.0057	0.0059	0.0060	0.0062
-2.4	0.0064	0.0066	0.0068	0.0069	0.0071	0.0073	0.0075	0.0078	0.0080	0.0082
-2.3	0.0084	0.0087	0.0089	0.0091	0.0094	0.0096	0.0099	0.0102	0.0104	0.0107
-2.2	0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139
-2.1	0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179
-2.0	0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228
-1.9	0.0233	0.0239	0.0244	0.0250	0.0256	0.0262	0.0268	0.0274	0.0281	0.0287
-1.8	0.0294	0.0301	0.0307	0.0314	0.0322	0.0329	0.0336	0.0344	0.0351	0.0359
-1.7	0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446
-1.6	0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548
-1.5	0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668
-1.4	0.0681	0.0694	0.0708	0.0721	0.0735	0.0749	0.0764	0.0778	0.0793	0.0808
-1.3	0.0823	0.0838	0.0853	0.0869	0.0885	0.0901	0.0918	0.0934	0.0951	0.0968
-1.2	0.0985	0.1003	0.1020	0.1038	0.1056	0.1075	0.1093	0.1112	0.1131	0.1151
-1.1	0.1170	0.1190	0.1210	0.1230	0.1251	0.1271	0.1292	0.1314	0.1335	0.1357
-1.0	0.1379	0.1401	0.1423	0.1446	0.1469	0.1492	0.1515	0.1539	0.1562	0.1587
-0.9	0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841
-0.8	0.1867	0.1894	0.1922	0.1949	0.1977	0.2005	0.2033	0.2061	0.2090	0.2119
-0.7	0.2148	0.2177	0.2206	0.2236	0.2266	0.2296	0.2327	0.2358	0.2389	0.2420
-0.6	0.2451	0.2483	0.2514	0.2546	0.2578	0.2611	0.2643	0.2676	0.2709	0.2743
-0.5	0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085
-0.4	0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446
-0.3	0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821
-0.2	0.3829	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207
-0.1	0.4247	0.4286	0.4325	0.4364	0.4404	0.4443	0.4483	0.4522	0.4562	0.4602
-0.0	0.4641	0.4681	0.4721	0.4761	0.4801	0.4840	0.4880	0.4920	0.4960	0.5000

FORMULAE

$$s = \sqrt{\frac{1}{n-1} \left[\sum x^2 - \frac{(\Sigma x)^2}{n} \right]}$$

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

$$CV = \frac{s}{\bar{x}} \times 100$$

$$PCS = \frac{3(\bar{x} - \tilde{x})}{s}$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$V(X) = E(X^2) - E(X)^2$$

$$E(X) = \sum xp(x)$$

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

$$P(X) = e^{-\mu} \left(\frac{\mu^x}{x!} \right)$$

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

$$\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$\bar{x} \pm z_{\alpha/2} \frac{s}{\sqrt{n}}$$

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

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

$$t = \frac{\bar{x} - \mu_{\bar{x}}}{\frac{s}{\sqrt{n}}}$$

$$S_{xx} = \sum x^2 - \frac{(\Sigma x)^2}{n}$$

$$S_{yy} = \sum y^2 - \frac{(\Sigma y)^2}{n}$$

1. This question paper consists of 10 printed pages including this cover page.

2. Answer ALL questions for Section A in the ANSWER BOOKLET.

3. Answer ANY FIVE Questions for Section B in the ANSWER BOOKLET.

$$S_{xy} = \sum xy - \frac{\Sigma x \Sigma y}{n}$$

$$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}}$$

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$$

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x$$

$$r = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}}$$

$$r^2 = \frac{S_{xy}^2}{S_{xx} S_{yy}}$$