UNIVERSITI KUALA LUMPUR BUSINESS SCHOOL

FINAL EXAMINATION

JANUARY 2016 SEMESTER

SUBJECT CODE	:	**EIB11103**
SUBJECT TITLE	:	**BUSINESS STATISTICS**
LEVEL	:	**BACHELOR**
TIME / DURATION	:	**2:00PM – 5:00PM / 3 HOURS**
DATE	:	**19TH MAY 2016**

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of **EIGHT (8)** questions. Answer **ALL** questions.
4. Please write your answers on the answer booklet provided.
5. All questions must be answered in **English** (any other language is not allowed).
6. This question paper must not be removed from the examination hall.

THERE ARE SIX (6) PAGES OF QUESTIONS, ONE (1) PAGE OF FORMULAE AND ONE (1) PAGE OF TABLE, EXCLUDING THIS PAGE.

Total: 100 marks

Question 1

Given a sample data as below:

31	45	98	88	28	13	52	68	70	52	72	85

A. Arrange the data in ascending order and prepare the relevant columns for the calculation of variance and standard deviation.

(1.5 marks)

B. Find the following:

i. Mean;

(1.5 marks)

ii. Median;

(1.5 marks)

iii. Mode;

(1.5 marks)

iv. Variance;

(1.5 marks)

v. Standard deviation;

(1.5 marks)

vi. Range;

(1.5 marks)

vii. First Quarter (Q1);

(1.5 marks)

viii. Second Quarter (Q2);

(1.5 marks)

ix. Third Quarter (Q3);

(1.5 marks)

x. Inter Quartile Range (IQR); and

(1.5 marks)

xi. 90th percentile.

(1.5 marks)

[18 marks]

Question 2

Below is a sample group data.

i	Ki	xi	fi	cfi	fixi	xi^2	$fixi^2$
1		15.0	4				
2		20.0	8				
3		25.0	12				
4		30.0	14				
5		35.0	9				
6		40.0	3				
	TOTAL		50				

Copy the above table to your answer script:

A. Complete the table.

(4 marks)

B. Find the values of:

i. Mean;

(2 marks)

ii. Median;

(3.5 marks)

iii. Mode;

(3.5 marks)

iv. Variance; and

(3.5 marks)

v. Standard deviation.

(1.5 marks)

[18 marks]

Question 3

A local bank reviewed its credit card policy with the intention of recalling some of its credit cards. In the past, approximately 5% of cardholders defaulted, leaving the bank unable to collect the outstanding balance. Hence, management established a prior probability of 0.05 that any particular cardholder will default. The bank also found that the probability of missing a monthly payment is 0.20 for customers who do not default. Of course, the probability of missing a monthly payment for those who default is 1.

Required:

A. Given that a customer missed one or more monthly payments, compute the posterior probability that the customer will default.

(8 marks)

B. The bank would like to recall its card if the probability that a customer will default is greater than 0.20. Should the bank recall its card if the customer misses a monthly payment? Why or why not?

(2 marks)

[10 marks]

Question 4

A university found that 20% of its students withdrew without completing the introductory statistics course. Assume that 20 students registered for the course.

Required:

A. Compute:

i. The probability that two or fewer will withdraw.

(2.5 marks)

ii. The probability that exactly four will withdraw.

(2.5 marks)

iii. The probability that more than three will withdraw.

(2.5 marks)

B. Compute the expected number of withdrawals.

(2.5 marks)

[10 marks]

Question 5

The average stock price for companies making up the S&P 500 is $30, and the standard deviation is $8.20 (*BusinessWeek*, Special Annual Issue, Spring 2014). Assume the stock prices are normally distributed.

Required:

A. What is the probability that a company will have a stock price of at least $40?

(4 marks)

B. What is the probability that a company will have a stock price no higher than $20?

(3 marks)

C. How high does a stock price have to be to put a company in the top 10%?

(3 marks)

[10 marks]

Question 6

The average price of a gallon of unleaded regular gasoline was reported to be $2.34 in northern Kentucky (*The Cincinnati Enquirer*, January 21, 2015). Use this price as the population mean, and assume the population standard deviation is $0.20.

Required:

A. What is the probability that the mean price for a sample of 30 service stations is within $0.03 of the population mean?

(3 marks)

B. What is the probability that the mean price for a sample of 50 service stations is within $0.03 of the population mean?

(3 marks)

C. What is the probability that the mean price for a sample of 100 service stations is within $0.03 of the population mean?

(3 marks)

D. Which, if any, of the sample sizes in parts (A), (B), or (C) would you recommend to have at least a 0.95 probability that the sample mean is within $0.03 of the population mean?

(5 marks)

[14 marks]

Question 7

The National Quality Research Centre at the University of Michigan provides a quarterly measure of consumer opinions on products and services (The Wall Street Journal, February 18, 2015). A survey of 10 restaurants in the Fast Food / Pizza group showed a sample mean of customer satisfaction index of 71. Past data indicated that the population standard deviation is $\sigma = 5$.

Required:

A. What is the assumption should the researcher be willing to make if a certain margin of error is desired?

(2 marks)

B. What is the margin of error at 95% confidence?

(2 marks)

C. What is the margin of error at 99% confidence?

(2 marks)

D. Provide a 95% confidence interval of the population mean.

(4 marks)

[10 marks]

Question 8

The following data give the percentage of women working in five companies in the retail and trade industry. The percentage of management jobs held by women in each company is also shown.

% Working	67	45	73	54	61
% Management	49	21	65	47	33

Required:

A. Develop a scatter diagram for these data with the percentage of women working in the company as the independent variable.

(3 marks)

B. What does the scatter diagram developed in part (A) indicate about the relationship between the two variables?

(2 marks)

C. Develop the estimated regression equation by competing the values of b_0 and b_1

(3 marks)

D. Predict the percentage of management jobs held by women in a company that has 60% women employees.

(2 marks)

[10 marks]

END OF QUESTION PAPER

LIST OF FORMULAS

STATISTICS

Mean for sample, $\bar{x} = \dfrac{\sum f_i x_i}{\sum_{i=1}^{n} f_i}$

Variance for sample (Ungrouped data),

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

Variance for sample (Grouped data),

$s^2 = \dfrac{\sum \left[f_i (x_i - \bar{x})^2 \right]}{n-1}$

Standard deviation, $s = \sqrt{s^2}$

PROBABILITY

P(A) = 1 – P(A') – Rule of complement

P(A or B) = P(A) + P(B) – P(A ∩ B) - Not Mutually Exclusive event

P(A or B) = P(A) + P(B) – Mutually exclusive event

P(A and B) = P(A) x P(B|A) – Conditional / Dependent event

P(A and B) = P(A) x P(B) – Independent event

${}_nP_r = \dfrac{n!}{(n-r)!}$

${}_nC_r = \dfrac{n!}{(n-r)!r!}$

PROBABILITY DISTRIBUTION

$\mu = \Sigma x \,.\, P(X)$

$\sigma = \sqrt{\sum \left[x^2 - P(X) \right] - \mu^2}$

$P(X) = \dfrac{n!}{(n-x)!x!} \bullet p^x \bullet q^{n-x}$ - Binomial Formula

$\mu = n \,.\, p$ - Binomial Formula

$\sigma^2 = n \bullet p \bullet q$

NORMAL DISTRIBUTION

$Z = \dfrac{x - \bar{x}}{s}$

Z test = $\bar{x} \pm z_{\alpha/2} \bullet \dfrac{\sigma}{\sqrt{n}}$

CONFIDENCE INTERVAL – ONE POPULATION

$\hat{p} - E < \hat{p} + E$ where $E = z_{\frac{\alpha}{2}} \bullet \sqrt{\dfrac{\hat{p}\hat{q}}{n}}$ and σ known

$\bar{x} - E < \mu < \bar{x} + E$ where $E = z_{\frac{\alpha}{2}} \bullet \dfrac{\sigma}{\sqrt{n}}$ and σ known and for σ unknown, E = $t_{\frac{\alpha}{2}} \bullet \dfrac{s}{\sqrt{n}}$

TEST STATISTICS

$z = \dfrac{\hat{p} - p}{\sqrt{\dfrac{pq}{n}}}$, for proportion and σ known

$z = \dfrac{\bar{x} - \mu}{\dfrac{\sigma}{\sqrt{n}}}$, for mean and σ known

$t = \dfrac{\bar{x} - \mu}{\dfrac{s}{\sqrt{n}}}$ for both and σ unknown

SAMPLE SIZE DETERMINATION

$n = \dfrac{\left[z_{\frac{\alpha}{2}} \right]^2 \bullet 0.25}{E^2}$, for proportion ($\hat{p}$ and $\hat{q}$ unknown)

$n = \dfrac{\left[z_{\frac{\alpha}{2}} \right]^2 \bullet \hat{p} \bullet \hat{q}}{E^2}$, for proportion ($\hat{p}$ and $\hat{q}$ known)

LINEAR CORRELATION

Slope, $b_1 = \dfrac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2} = \dfrac{SS_{xy}}{SS_{xx}}$

$b_o = \bar{y} - b_1 \bar{x}$, Regression, $\hat{y} = b_o + b_1 x$

$r = \dfrac{n\Sigma xy - \Sigma x \Sigma y}{\sqrt{\left(n\Sigma x^2 - (\Sigma x)^2 \right)\left(n\Sigma y^2 - (\Sigma y)^2 \right)}}$

CUMULATIVE STANDARD NORMAL DISTRIBUTION

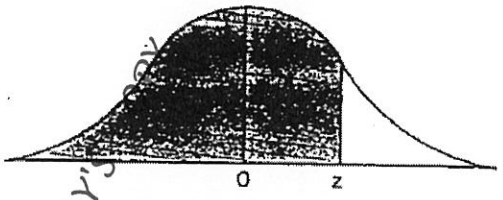

Table entries are cumulative probabilities represented in the shaded area above.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

z	1.282	1.645	1.960	2.326	2.575	3.090	3.291	3.981	4.417
F(z)	.90	.95	.975	.99	.995	.999	.9995	.99995	.999995

Source: Adapted by permission from A. M. Mood, *Introduction to the Theory of Statistics*, Table II, New York: McGraw-Hill Book Company, 1950.