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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016

COURSE NAME	:	STATISTICS
COURSE CODE	:	DAS 20502
PROGRAMME	:	2 DAU
EXAMINATION DATE	:	DECEMBER 2015/JANUARY 2016
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTIONS	:	A) ANSWER **ALL** QUESTIONS IN **PART A** B) ANSWER **THREE (3)** QUESTIONS IN **PART B**

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

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PART A

Q1 A researcher wishes to determine if a person's age is related to the number of hours he or she jogging per week. The data for sample are shown in **Table Q1**.

Table Q1

Age, x	18	25	30	35	40	45
Hours, y	9	6	4	3	4	1

(a) Find S_{xx}, S_{yy} and S_{xy}.

(9 marks)

(b) Find and interpret the sample correlation coefficient, r.

(2 marks)

(c) Find $\widehat{\beta_1}$ and $\widehat{\beta_0}$.

(4 marks)

(d) Find the estimated regression line, $\hat{y}$ and sketch this line.

(3 marks)

(e) Estimate value of $\hat{y}$ if $x = 33$.

(2 marks)

Q2 (a) Each packet of keropok must weigh 100g. Asiah randomly selected 40 packets and found that the mean weight is 105g and the standard deviation is 2.7g. Assume the population is distributed approximately normal. Test at 5% significance level whether the mean weight per packet is more than 100g.

(10 marks)

(b) The mean lifetime of 35 batteries produced by Company May is 55 hours and the mean lifetime of 40 batteries produced by Company Luz is 50 hours. If the standard deviation of all batteries produced by Company May is 3.5 hours and the standard deviation of all batteries produced Company Luz is 4 hours, test at 1% significance level that the mean lifetime of batteries produced by Company May is better than the mean lifetime of Company Luz. Assume the data was taken from a normal distribution.

(10 marks)

PART B

Q3 Given the **Table Q3.**

(a) Copy and complete the **Table Q3.**

Table Q3

Class limit	Lower boundary	x	F	$f_i x_i$	x_i^2	$f_i x_i^2$
1 – 5			5			
6 – 10			3			
11 – 15			19			
16 – 20			14			
21 – 25			10			
26 – 30			4			
			Σ=	Σ=		Σ=

(6 marks)

(b) Find the

(i) Mean, Median and Mode

(10 marks)

(ii) Standard deviation

(4 marks)

Q4 (a) From *Current Report,* the job status of Malaysian adults by gender is shown in **Table Q4(a).**

Table Q4(a)

	Unemployed, U	Blue Collar, B	White Collar, W	No Collar, N
Male, M	0.19	0.22	0.24	0.35
Female, F	0.23	0.29	0.26	0.22

(i) Find the marginal probabilities of Unemployed, Blue Collar, White Collar, No Collar, Male and Female respectively

(6 marks)

(ii) Determine the probability that the adult selected is No Collar and Male.

(2 marks)

(iii) Calculate the probability that the adult selected is a male, given that the adult selected is White Collar.

(2 marks)

(b) x is a continuous random variable with probability density function given by

$$f(x) = \begin{cases} x + ax & 2 < x < 5 \\ 0 & otherwise \end{cases}$$

where α is a constant.

(i) Determine the value of a.

(4 marks)

(ii) Calculate probabilities $P(1 < X < 4)$

(3 marks)

(iii) Determine $E(X)$

(3 marks)

Q5 (a) The number of students come to library per hour follows a Poisson distribution. If the average number of student comes per hour is 38 students, find

(i) the number of students come to library per half an hour.

(2 marks)

(ii) probability that at most 50 students come to library per hour.

(4 marks)

(iii) probability that more than 10 students come to library in fifteen minutes.

(4 marks)

(b) The average lifetimes of cell phones is 24.3 months with variance 6.8 months. Assume cell phone life is a normally distributed variable. Find the probability that the lifetimes of cell phones will be

(i) less than 23.8 months.

(5 marks)

(ii) in between 22 and 25 months.

(5 marks)

Q6 (a) Engineers must consider the breadths of male heads when designing motorcycle helmets. Men have head breadths that are normally distributed with a mean of 15.24 cm and a standard deviation of 2.54 cm.

(i) If one male is randomly selected, find the probability that his head breadth is less than 15.75 cm.

(5 marks)

(ii) Find the probability that 100 randomly selected men have a mean head breadths at least 16.00 cm.

(5 marks)

(b) The average running times of films produced by Company A is 110.7 minutes with standard deviation of 29.8 minutes, while those of Company B have a mean running times of 98.4 minutes and a standard deviation of 7.8 minutes. Assume the populations are approximately normally distributed. Find the probability that a random sample of 49 films from Company A will have mean running times that at least 13 minutes more than the mean running times of a random sample of 36 films from Company B.

(10 marks)

Q7 (a) A research group conducts a survey of 19 people to find out what percent of their income the average donates to charity. If given the mean is 15 with a standard deviation of 5 percent. Find a 95% confidence interval for the mean. .

(8 marks)

(b) Given those 40 male and 40 female students took part in a activity to find mean commuting distances. The mean number of miles traveled by female students was 5.6 and the standard deviation was 2.8. The mean number of miles traveled by male students was 14.3 and the standard deviation was 9.1. Construct a 90% confidence interval for the difference between mean numbers of miles traveled by male and female to students. Assume that the population variances are normally distributed.

(12 marks)

- END OF QUESTION -

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Formula

$$S_{xy}=\sum x_i y_i-\frac{\sum x_i \sum y_i}{n},\ S_{xx}=\sum x_i^2-\frac{\left(\sum x_i\right)^2}{n},S_{yy}=\sum y_i^2-\frac{\left(\sum y_i\right)^2}{n},$$

$$r=\frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}},\quad \hat{\beta}_1=\frac{S_{xy}}{S_{xx}},\quad \hat{\beta}_0=\bar{y}-\hat{\beta}_1\bar{x},$$

$$Z=\frac{\bar{x}-\mu}{\sigma/\sqrt{n}},Z=\frac{\bar{x}-\mu}{s/\sqrt{n}},\quad T=\frac{\bar{x}-\mu}{s/\sqrt{n}}$$

$$Z=\frac{(\bar{X}_1-\bar{X}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}},Z=\frac{(\bar{X}_1-\bar{X}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}}$$

$$\bar{x}=\frac{\sum f_i x_i}{\sum f_i},\ M=L_M+C\times\left(\frac{n/2-F}{f_m}\right),\ M_0=L+C\times\left(\frac{d_b}{d_b+d_a}\right)$$

$$s^2=\frac{1}{\Sigma f-1}\left[\sum_{i=1}^{n} f_i x_i^2-\frac{(\Sigma f_i x_i)^2}{\Sigma f}\right]$$

$$\sum_{i=-\infty}^{\infty}p(x_i)=1,\ E(X)=\sum_{\forall x}xp(x),\ \int_{-\infty}^{\infty}f(x)\ dx=1,\ E(X)=\int_{-\infty}^{\infty}xp(x)\ dx,$$

$$Var(X)=E(X^2)-[E(X)]^2,$$

$$P(x)=\binom{n}{x}\cdot p^x\cdot(1-p)^{n-x}\quad x=0,1,\ldots,n,\ P(X=r)=\frac{e^{-\mu}\cdot\mu^r}{r!}\quad r=0,1,\ldots,\infty,$$

$X\sim N(\mu,\sigma^2)$, $Z\sim N(0,1)$ and $Z=\dfrac{X-\mu}{\sigma}$

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$$\bar{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right), \quad Z = \frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \sim N(0,1), \quad \bar{X}_1 - \bar{X}_2 \sim N\left(\mu_1 - \mu_2, \frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}\right),$$

$$\bar{x} - z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right) < \mu < \bar{x} + z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$$\bar{x} - z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right) < \mu < \bar{x} + z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$$

$$\bar{x} - t_{\alpha/2, v}\left(\frac{s}{\sqrt{n}}\right) < \mu < \bar{x} + t_{\alpha/2, v}\left(\frac{s}{\sqrt{n}}\right), \; v = n-1.$$

$$(\bar{x}_1 - \bar{x}_2) - z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}},$$

$$(\bar{x}_1 - \bar{x}_2) - z_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + z_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}},$$

$$(\bar{x}_1 - \bar{x}_2) - t_{\alpha/2, v}\, S_P\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + t_{\alpha/2, v}\, S_P\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \text{ where}$$

$$S_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \text{ and } v = n_1 + n_2 - 2,$$

$$(\bar{x}_1 - \bar{x}_2) - t_{\alpha/2, v}\sqrt{\frac{1}{n}\left(s_1^2 + s_2^2\right)} < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + t_{\alpha/2, v}\sqrt{\frac{1}{n}\left(s_1^2 + s_2^2\right)} \text{ and } v = 2(n-1),$$

$$(\bar{x}_1 - \bar{x}_2) - t_{\alpha/2, v}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + t_{\alpha/2, v}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \text{ and}$$

$$v = \frac{\left(s_1^2/n_1 + s_2^2/n_2\right)^2}{\dfrac{\left(s_1^2/n_1\right)^2}{n_1 - 1} + \dfrac{\left(s_2^2/n_2\right)^2}{n_2 - 1}}$$