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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

COURSE NAME	:	STATISTICS
COURSE CODE	:	DAS 20502
PROGRAMMECODE	:	2 DAU
EXAMINATION DATE	:	DECEMBER 2016 / JANUARY 2017
DURATION	:	2HOURS 30 MINUTES
INSTRUCTION	:	A) ANSWERS **ALL** QUESTIONS IN **SECTION A** B) ANSWER **FOUR (4)** QUESTIONS IN **SECTION B**

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

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SECTION A

Q1 Researcher Azmirul wishes to determine if a person's time spent in the gymnasium is related to the weight loss per week. The data for sample are shown in **Table Q1**.

Table Q1

Time, x	6	7	15	21	25	30
Weight Loss, y	1	1	3	3.5	4	6

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

(9 marks)

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

(3 marks)

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

(4 marks)

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

(2 marks)

(e) Estimate value of $\hat{y}$ if $x = 23$.

(2 marks)

Q2 (a) Each packet of kerepek must weigh 100g. Faqirudin randomly selected 36 packets and found that the mean weight is 105g and the standard deviation is 0.9g. 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 37 tyres produced by Company Lutfi is 955 km and the mean lifetime of 40 tyres produced by Company Aiman is 953 km. If the standard deviation of all tyres produced by Company Lutfi is 3 km and the standard deviation of all batteries produced Company Aiman is 4 km, test at 1% significance level that the mean lifetime of batteries produced by Company Lutfi is better than the mean lifetime of Company Aiman. Assume the data was taken from a normal distribution

(10 marks)

SECTION B

Q3 From the research done by Nazmi, the findings are given in **Table Q3.**

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

Table Q3

Class limit	Lower boundary	x	F	$f_i x_i$	x_i^2	$f_i x_i^2$
11 – 15			6			
16 – 20			4			
21 – 25			17			
26 – 30			12			
31 – 35			7			
36 – 40			4			
			Σ=	Σ=		Σ=

(6 marks)

(b) Find the

(i) Mean, Median and Mode

(10 marks)

(ii) Standard deviation

(4 marks)

Q4 (a) From *Majalah Kini* , Azizi reported that due to male entering nursing school, the number of Malaysian male and female working in Hospital Datuk Abdullah is shown in **Table Q4(a).**

Table Q4(a)

	Dental Nurse, D	Staff Nurse, S	Assistant Nurse, A
Male, M	19	45	0
Female, F	36	54	16

(i) Complete the contingency table. Find the marginal probabilities of Dental Nurse, Staff Nurse, Assistant Nurse, Male and Female.

(7 marks)

(ii) Determine the probability that the nurse selected is Dental Nurse and a Male.

(2 marks)

(iii) Calculate the probability that the adult selected is a female, given that she is a Staff Nurse.

(3 marks)

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

$$f(x)=\begin{cases} 6(x-1)(2-x) & 1<x<2 \\ 0 & otherwise \end{cases}$$

where α is a constant.

(i) Determine the mean and standard deviation. (6 marks)

(ii) Calculate probabilities $P(0<X<1.5)$ (2 marks)

Q5 (a) The number of students swimming in the university new pool follows a Poisson distribution. If the average number of student comes per week is 112 students, find

(i) the number of students swimming per day. (2 marks)

(ii) probability that at most 24 students swimming per day. (4 marks)

(iii) probability that more than 10 students swimming in per day. (4 marks)

(b) The average lifetimes of printer is 36 months with variance 5.9 months. Assume cell phone life is a normally distributed variable. Find the probability that the lifetimes of cell phones will be

(i) less than 30 months. (5 marks)

(ii) in between 34 and 40 months. (5 marks)

Q6 (a) Maisarah must consider the height of male when ordering double decker bed. The height are normally distributed with a mean of 166.3 cm and a standard deviation of 5.4 cm.

(i) If one male is randomly selected, find the probability that his height is less than 157.5 cm.

(5 marks)

(ii) Find the probability that 10 randomly selected men have a mean height at least 160.2 cm.

(5 marks)

(b) The average running times of drama produced by Company Maslinda is 100.9 minutes with standard deviation of 9.5 minutes, while those of Company Syahirah have a mean running times of 95.7 minutes and a standard deviation of 7.9 minutes. Assume the populations are approximately normally distributed. Find the probability that a random sample of 25 films from Company Maslinda will have mean running times that at least 9 minutes more than the mean running times of a random sample of 16 films from Company Syahirah.

(10 marks)

Q7 (a) A research group conducts a survey of 29 people to find out what percent of their income the average spend on vitamins. If given the mean is 3.5 with a standard deviation of 1.5 percent. Find a 95% confidence interval for the mean.

(8 marks)

(b) Given those 36 male and 36 female students took part in a activity to find mean walking in to class in the university per day. The mean number of km traveled by female students was 2.5 and the standard deviation was 0.8. The mean number of miles traveled by male students was 1.3 and the standard deviation was 1.9. Construct a 95% 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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