QUESTION 1	Marks	Remark
i) Sample proportion / p ii) $H_0 : \pi = 0.75$ (claim) $H_1 : \pi \neq 0.75$ A 92% confidence interval for π = $(0.538, 0.722)$ Since $\pi_0 = 0.75$ do not lies within the confidence interval $(0.538, 0.722)$, reject H_0 At $\alpha = 0.08$, there is enough evidence to reject the claim that true proportion of Malaysian drivers who do not trust the self-parking technology is 0.75.		
TOTAL	**6 Marks**	
QUESTION 2	**Marks**	**Remark**
i) $H_0 : \sigma_1^2 = \sigma_2^2$ (claim) $H_1 : \sigma_1^2 \neq \sigma_2^2$ $f_{test} = \frac{s_1^2}{s_2^2} = \frac{33.7794}{46.5199} = 0.7261$ $f_{0.05,16,23} = 2.1086$ $f_{0.95,16,23} = \frac{1}{f_{0.05,23,16}} = \frac{1}{2.2443} = 0.4456$ Since $(f_{0.95,16,23} = 0.4456) < f_{test} = 0.7261 < (f_{0.05,16,23} = 2.1086)$, do not reject H_0 At $\alpha = 0.1$, there is enough evidence to support the claim that $\sigma_1^2 = \sigma_2^2$.		

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ii) $H_0 : \mu_1 - \mu_2 = 0$
$H_1 : \mu_1 - \mu_2 \neq 0$ (claim)

$P - value = (0.3399)$

Since $(P - value = 0.3399) > (\alpha = 0.03)$, do not reject H_0

At $\alpha = 0.03$, there is enough evidence to reject the claim that the true mean of CO level for nicotine patch group is different from control group.

iii) No

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<tr><td align="right">TOTAL</td><td>14 Marks</td><td></td></tr>
<tr><td align="center">QUESTION 3</td><td>Marks</td><td>Remark</td></tr>
<tr><td>

i)
Factors : Gender of children and type of pineapple pulp supplement

ii)
No. of treatment = 2 x 3 =6
List of treatments:

Boys, Placebo Boys, Low dose Boys. High dose	Girls, Placebo Girls, Low dose Girls. High dose

iii)

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$X = 2(3)(5-1) = 24$ $Y = \frac{28}{24} = 1.1667$ $Z = \frac{0.4334}{1.1667} = 0.3715$ iv) H_0 : There is no interaction effect between gender and type of pineapple pulp supplements H_1 : There is an interaction effect between gender and type of pineapple pulp supplements Since $\left(f_{test} = 0.3715 < f_{crit} = 3.4028 \right)$ OR ($P - value = 0.6936 > \alpha = 0.05$) Do not reject H_0 At , $\alpha = 0.05$, there is no interaction effect between gender and type of pineapple pulp supplements v) The marginal effect should be tested since there is no interaction effect between gender and type of pineapple pulp supplements.		
TOTAL	**15 Marks**	
QUESTION 4	**Marks**	**Remark**
i) Dependent variable : sales number of air filter Independent variable : air quality index (AQI) ii)		

$$S_{xy} = 1963.6 - \frac{798(23.2)}{10} = 112.24$$

$$S_{xx} = 69026 - \frac{(798)^2}{10} = 5345.6$$

$$S_{yy} = 57.06 - \frac{(23.2)^2}{10} = 3.236$$

$$r = \frac{112.24}{\sqrt{(3.236)(5345.6)}} = 0.8534$$

iii)

As the reading of AQI increases, so as the sales number of air filter.

iv)

$$\hat{y} = 0.6442 + 0.021x$$

$$= 06442 + 0.021(78)$$

$$= 2.2822 \text{ (in thousand unit) @ } 2282.2 \text{ units}$$

v)

H_0 : There is no linear relationship between the reading of AQI and the sales numbers of air filter.

H_1 : There is a linear relationship between the reading of AQI and the sales numbers of air filter.

$se(\beta)=\left[\dfrac{3.236-0.0210(112.24)}{8}\right]\left(\dfrac{1}{5345.6}\right)$ $=0.0045$ $t_{test}=\dfrac{0.021-0}{0.0045}=4.6667$ $t_{0.0025,8}=3.8325$ Since $(t_{test}=4.6667>t_{crit}=3.8325)$ Reject H_0 At , $\alpha=0.005$, there is a linear relationship between the reading of AQI and the sales numbers of air filter.		
TOTAL	**20 Marks**	
QUESTION 5	**Marks**	**Remark**
i) 0.7382 73.82% variation in the risk of lake eutrophication can be predicted by average lake depth, external phosphorus loading rate and flushing rate. ii) When the average lake depth and external phosphorus loading rate are held constants, the risk of eutrophication decreases by 2.1661% for an increase of 1×10^{-3} d^{-1} in flushing rate. iii) $H_0: \beta_1=\beta_2=\beta_3=0$ $H_1: \beta_j \neq 0$ for at least one j = 1, 2, 3 P-value = 0.0064 Since (P-value = 0.0064) < (α = 0.01), we reject H_0		

At α = 0.01, at least one independent variable is related to the dependent variable.

iv)

Predictor	P-value	r^2	Adjusted r^2	Regression model
D, L, F	0.0064	0.8287	0.7382	$\hat{R} = -7.9239 + 3.5368D + 3.7345L - 2.1661F$

v)
Best model: $\hat{R} = 41.3200 + 38.9761L$

vi)
Best model$\hat{R} = -4.1900 + 4.1846D + 2.3189L$
Because it has the lowest significant P-value and the highest adjusted $r^2 = 0.9250$.

vii)

$$\begin{aligned}\hat{R} &= -4.19 + 4.1846D + 2.3189L \\ &= -4.19 + 4.1846(19) + 2.3189(0.125) \\ &= 75.6073\%\end{aligned}$$

TOTAL	**19 Marks**	
QUESTION 6	**Marks**	**Remark**
a) i) to compare observed value and expected value		

ii) the data are obtained from a random sample OR
the data is observed frequency OR

the expected frequency for each category must be at least five

b) i) 240 – (73+40+41+33+9) = 44

ii) H_0 : The recent study does not differ from previous study
H_1 : The recent study does differ from previous study

O_i	P_i	E_i		O_i	E_i	$\frac{(O_i - E_i)^2}{E_i}$
73	0.35	84	Combine >>	73	84	1.4405
41	0.15	36		41	36	0.6944
40	0.14	33.6		40	33.6	1.2190
44	0.23	55.2		44	55.2	2.2725
33	0.11	26.4		42	31.2	3.7385
9	0.02	4.8				
						$\chi^2_{test} = 9.3649$

$\chi^2_{0.1,4} = 7.7794$

Since $\left(\chi^2_{test} = 9.3649\right) > \left(\chi^2_{0.1,4} = 7.7794\right)$, reject H_0

At $\alpha = 0.1$, there is enough evidence to support the claim that the recent study differs from previous study.

OR

	Marks	Remark
H_0 : The recent study does not differ from previous study H_1 : The recent study does differ from previous study		

O_i	P_i	E_i	$\frac{(O_i - E_i)^2}{E_i}$
73	0.35	84	1.4405
41	0.15	36	0.6944
40	0.14	33.6	1.2190
44	0.23	55.2	2.2725
33	0.11	26.4	1.6500
9	0.02	4.8	3.6750
			$\chi^2_{test} = 10.9514$

$\chi^2_{0.1,5} = 9.2364$

Since $\left(\chi^2_{test} = 10.9514\right) > \left(\chi^2_{0.1,4} = 9.2364\right)$, reject H_0

At $\alpha = 0.1$, there is enough evidence to support the claim that the recent study differs from previous study.

TOTAL	**13 Marks**	
QUESTION 7	**Marks**	**Remark**

a) No

b)

i) 30 + P + Q = 110

P + Q = 80

P = 40, Q = 40

ii)

H_o: The occurrence of these types of crime is independent on the city area

H_1: The occurrence of these types of crime is dependent on the city area

O_{ij}	$E_{ij} = \frac{n_i \times n_j}{n_{..}}$	$\frac{(O_{ij}-E_{ij})^2}{E_{ij}}$
O_{11}	37.8947	0.1170
O_{12}	53.6842	0.7430
O_{13}	28.4211	2.4951
O_{21}	47.3684	0.1462
O_{22}	67.1053	0.1249
O_{23}	35.5263	0.8596
O_{31}	34.7368	0.6459
O_{32}	49.2105	1.7239
O_{33}	26.0526	7.4668
		$\chi^2_{test} = 14.3224$

Since $(\chi^2_{test} = 14.3224) > \left(\chi^2_{0.025,2(2)} = 11.1433\right)$, then we reject H_o

At α = 0.025, we can conclude that the occurrence of these types of crime is dependent on the city area.

TOTAL	**13 Marks**	