Answer to the question no: (01)

ⓐ

$$P(x) = \frac{1}{1 + e^{-(-4.08 + 0.857x)}}$$

$$\log(O(x)) = e^{-4.08 + 0.857x}$$

ⓑ

$$P(4) = \frac{1}{1 + e^{-(-4.08 + 0.857 \times 4)}}$$

$$= 0.3425$$

ⓒ Let assume the Jones studies x hours per week.

If he studies 2 additional hours it becomes $(x+2)$ hours.

Previous odds, $O(x) = e^{-4.08 + 0.857x}$

[P.T.O.

last odds

$$O(n+2) = e^{-9.08 + 0.857(n+2)}$$

$$\frac{O(n+2)}{O(n)} = \frac{e^{-9.08 + 0.857(n+2)}}{e^{-9.08 + 0.857n}}$$

$$= e^{2 \times 0.0857}$$

$$= e^{2\hat{b}}$$

$\therefore$ If he studies 2 additional hours per weeks, his odds of passing becomes $e^{2\hat{b}}$ times.

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Answer to the question no: (02)

$H_0 : \mu_1 = \mu_2 = \mu_3 = \mu_4$

H_1 : At least two means are un-equal.

$\overline{Y_{1.}} = 1.4133$

$\overline{Y_{2.}} = 1.2733$ $\qquad \overline{Y} = 1.2775$

$\overline{Y_{3.}} = 1.24$

$\overline{Y_{4.}} = 1.1833$

Methods			
A	1.35	1.40	1.49
B	1.13	1.23	1.46
C	1.06	1.26	1.22
D	0.96	1.22	1.35

$m = 4$

$n = 3$

$$SS_A = n \sum_{i=1}^{4} (\overline{Y_{i.}} - \overline{Y})^2$$

$$= 3 \times \{ (1.4133 - 1.2775)^2 + (1.2733 - 1.2775)^2 + (1.24 - 1.2775)^2 + (1.1833 - 1.2775)^2 \}$$

[P.T.O.]

$= 0.08621$

$$SS_T = \sum_{i=1}^{m} \sum_{j=1}^{n} (Y_{ij} - \bar{Y})^2$$

$= 0.282425$

$$SS_E = SS_T - SS_A = 0.\cancel{0}282425 - 0.08621$$

$= 0.196215$

$$F = \frac{SS_A / (m-1)}{SS_E / (N-m)}$$

$$= \frac{0.08621/3}{0.196215/8}$$

$= 1.1716$

$F_{0.05,3,8} = 4.07$ (from table)

$F < F_{0.05,3,8}$

$\therefore$ Null accepted

∴ Methods are equally effective.

Answer to the question no: (03)

(a)

H_0 : Motion sickness does not depend on gender

H_1 : Motion sickness depends on gender.

Data	Mild	Moderate	Severe	total
Male	20 (12.987)	10 (15.584)	10 (11.43)	40
Female	30 (37.01)	50 (44.41)	34 (32.57)	114
total	50	60	44	154

$p(\text{mild}) = \frac{50}{154}$ $\quad$ $P(\text{Moderate}) = \frac{66}{154}$

$p(\text{Severe}) = \frac{44}{154}$

[P.T.O

$$\chi^2_{obs} = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$$= \frac{(20-12.987)^2}{12.987} + \frac{(10-15.589)^2}{15.581} + \frac{(10-11.4\ldots}{11.4\ldots}$$

$$+ \frac{(30-37.01)^2}{37.01} + \frac{(50-44.41)^2}{44.41} + \frac{(34-32.\ldots}{32.5\ldots}$$

$$= 3.787 + 2 + 0.1789 + 1.32775$$

$$+ 0.7036 + 0.0627$$

$$= 8.06$$

$(r-1)(c-1) = (2-1)\times(3\ldots$
$= 2$

$$\chi^2_{0.95,2} = 5.991$$

$$\chi^2_{obs} > \chi^2_{0.95,2}$$

$\therefore$ Null rejected.

$\therefore$ Motion of sickness depends on gender.

(b)

In the data, it is clear that the ratio of moderate and severe sickness is greater in female; so either female have more motion sickness or male and female have nearly equal motion sickness.

~~Ho: μ(F) = μ(F~~

$H_0 : \mu(F) = \mu(M)$

$H_1 : \mu(F) > \mu(M)$

That's why it is a one tailed test.

Answer to the question no: (04)

(a)

H_0: Median life expectancy is identical

H_1: Median life expectancy is different

1	2	3	4.5	4.5	6	7	8	9	10	11
45,	46,	48,	51,	51,	52,	53,	54,	55,	57,	59,

12	14	14	14
60,	62,	62,	62

P.T.O

$T = 1+2+3+4.5+4.5+6+9+14$

$= 44$

$\mu = \frac{n(m+n+1)}{2} = \frac{8(15+1)}{2}$

$= 64$

$\sigma^2 = \frac{mn(m+n+1)}{12} = 74.6667$

~~p-value $= 2\left(1-\phi\left(\frac{T-\mu}{\sigma}\right)\right)$~~

~~$2\left(1-\phi\left(\frac{44-64}{\sqrt{79.6667}}\right)\right)$~~

$= \cancel{1-\phi}\ \cancel{2\left(1-\phi(-2.314)\right)}$

$= 2\left(\cancel{1-1+}\phi(2.314)\right)$

$T < \mu$

$p\text{ value} = 2\phi\left(\frac{T-\mu}{\sigma}\right)$

$= 2 \times \phi(-2.314)$

$= 2(1-\phi(2.314))$

$= 2(1-0.9896)$

$= 2 \times 0.0104$

$= 0.0208$

$0.0208 < 0.05$

$\therefore$ Null rejected.

$\therefore$ Median life expectancy has a significant difference.

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(b)

For a parametric test, I need to cont out which type of distribution suits the sample.

For example if N is significally large than $N \sim$ Normal (μ, σ^2)

μ, σ^2 could be calculated from the sample itself.

[P.T.O.

Here, n is large. We can perform normal parametric test.