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Assignment - 2
Probability & Statistics

Question 1.

a) $\Sigma x^2 = 925000$ $\quad \Sigma x = 850$

$\Sigma y^2 = 3272717$ $\quad \Sigma y = 1737$

$\Sigma xy = 182560$

$S_{xx} = 852750$

$S_{yy} = 71000$

$S_{xy} = 34915$

$\beta = 0.040944$

$\alpha = 170.219$

$\therefore$ Eqn $= \alpha + \beta x$

$= 170.219 + 0.040944\, x$

$=$

b) $\because \beta = 0.040944$

i.e β is close 0

Hence it is not significant

Question 2.

i) $\Sigma x^2 = 12666.58$ $\quad \Sigma y = 385.2$

$\Sigma y^2 = 119026.9$ $\quad \Sigma x = 1162.5$

$\Sigma xy = 38191.41$

$S_{yy} = 6409.7125$ $\quad S_{xy} = 875.16$ $\quad S_{[illegible]} =$

$S_{xx} = 301.66$

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$\beta = 2.9011$

$\alpha = 3.7496$

$\therefore$ Eqn $= 3.7496 + 2.9011x$

(ii) $\sigma^2 = 387.0744$

$\therefore \hat{\beta} \sim N(\beta, \sigma^2/Sxx)$

$\therefore$ 95% C.I

$$\hat{\beta} \pm t_{2.5\%, 12} \left(\frac{\sigma}{\sqrt{Sxx}}\right)$$

$$= 2.9011 \pm (2.228)$$

$$= (0.379, 5.423)$$

(iii) $$Y \sim N\left(\hat{\alpha} + \beta x, \left(\frac{1}{n} + \frac{(x-\bar{x})^2}{Sxx}\right), \sigma^2\right)$$

$$u_0 \pm t_{\alpha/2, n-2} \sqrt{\left[\frac{1}{n} + \frac{(x_0-\bar{x})^2}{Sxx}\right]\sigma^2}$$

119.7936 ± 22.143

$(97.6504$ to $141.9306)$

Question 3.

(i) In city A & city B takes longer while travelling in neat hours while in city C and Bc time difference is similar where as in city D we might reach early

(ii) $\Sigma x = 39$ $\Sigma x^2 = 207$

$\Sigma y = 562$ $\Sigma y^2 = 40508$

$\Sigma xy = 285.3$

$S_{xx} = 54.9$

$S_{xy} = 661.2$

$S_{yy} = 8923.6$

(i) $r = \dfrac{S_{xy}}{\sqrt{S_{xx} \cdot S_{yy}}} = 0.944662$

(ii) $\beta = 12.04$

$\alpha = 9.22957$

$Eq^n = 9.22957 + 12.0437x$

(iii) $SS_{TOT} = SS_{REG} + SS_{RES}$

7963.30

$SS_{REG} = \dfrac{S^2_{xy}}{S_{xx}} = 8013.295$

$\therefore SS_{RES} = S_{yy} - \dfrac{S^2_{xy}}{S_{xx}}$

$\therefore SS_{TOT} = 8923.595 = 910.295$

(iv) $R^2 = \frac{S^2xy}{Sxx \cdot Syy} = 0.8123$

Question 7)

$\Sigma x = 174.13$

$\Sigma y = 197.84$

$\Sigma x^2 = 7545.90$

$\Sigma y^2 = 4747.45$

$Sxy = 2176.84$

$Sxx = 4789.4221$

$Syy = 1189.2076$

Question 8.

$\beta = \frac{Sxy}{Sxx} = 2.20017$

$X = -16.8432$

$\hat{y} = -16.8432$