Ques (2) $\Sigma x = 385.2$ $\Sigma x^2 = 12666.58$

(i) $\Sigma y = 1162.5$ $\Sigma y^2 = 119026.9$

$\Sigma xy = 38191.41$

$S_{xx} = 301.66$ $S_{yy} = 6409.7125$

$S_{xy} = 875.16$

$\hat{\beta} = 2.901147$ $\hat{\alpha} = 3.74818$

$$\boxed{y = 3.74818 + 2.901147x}$$

(ii) $$\hat{\sigma}^2 = \frac{1}{10}\left[S_{yy} - \frac{S_{xy}^2}{S_{xx}}\right]$$

$$= 387.0745.$$

$$-2.228 \leq \frac{\hat{\beta} - \beta}{\hat{\sigma} / \sqrt{S_{xx}}} \leq 2.228$$

$$\hat{\beta} - 2.228 \frac{\hat{\sigma}}{\sqrt{S_{xx}}} \leq \beta \leq \hat{\beta} + 2.288 \frac{\hat{\sigma}}{\sqrt{S_{xx}}}.$$

$$(0.377, 5.425).$$

3.19

So, $F_{4,28}$ tabulated is 2.21

and our calculated value is 3.28

So, we have sufficient evidences to reject Ho.

(c) Ho: They are independent of each other.

Ha: They are dependent.

Expected values

Paper cleared	Salary 3-5	5-8	8-10	10-12
0-3	27.42	23.089	14.43	11.06
4-6	15.15	12.76	7.97	6.14
7-9	14.43	12.15	7.59	5.82

$$\chi^2_{cal} = \frac{\Sigma(E_i - O_i)^2}{E_i}$$

$\Rightarrow$ 11.27 + 0.4133 + 4.925 + 3.3204 + 4.384 + 4.1079 + 6.162 + 1.4175 + 7.234 + 6.56 + 0.133 + 0.00319

$\Rightarrow$ $\boxed{39.929}$

$\chi^2_6 = 12.592$

Since $\chi^2_{cal} > \chi^2_{Tab}$; hence we have sufficient evidences to reject Ho.

Examining $\bar{y}_1 - \bar{y}_3 = 8$

Hence there is a significant diff. b/w means 1 & 3

~~So~~.

Sol ④ (i) Already in sol ③ (ii)

(iii) ~~For~~ $H_0 : \mu_1 = \mu_2 \cdots \mu_5$

H_a : atleast one of the mean is not same

$$\frac{T^2}{N} = \frac{(\Sigma y_1 + \Sigma y_2 + \Sigma y_3 + \Sigma y_4 + \Sigma y_5)^2}{N} = 104385.9394$$

$$SS_{Reg} = \frac{(354)^2}{7} + \frac{(386)^2}{8} + \frac{(87)^2}{6} + \frac{(645)^2}{7} + \frac{(384)^2}{5} - \frac{T^2}{N}$$

$$= 22325.68917$$

$$SS_{TOT} = 69930.0606.$$

$$SS_{RES} = SS_{TOT} - SS_{REG}$$

$$= 47604.37143$$

ANOVA

Sources of variation	df	SS	MS	F
Reg.	4	22325.69	5581.4225	3.2
Res	28	47604.3143	1700.154	
Total	33	69930.0606		

(iii) H_0 : The mean diff. is same for each city

H_0 : The mean diff are not same

$$SS_T = 1495 - \frac{103^2}{28} = 1116.11$$

$$SS_B = \frac{1}{7}\left(64^2+44^2+8^2+(-13)^2\right) - \frac{103^2}{28} = 516.11$$

$$SS_R = SS_T - SS_B = 600.00$$

ANOVA

Source	df	SS	MS	F
Treatments	3	516.11	172.04	6.88
Residual	24	600.00	25.00	
Total	27	1116.11		

Under H_0 : $f = \frac{172.04}{25} = 6.88$ using $F_{3,24}$ distribution

The 5% critical point is 3.009, so we have sufficient evidences to reject H_0.

(iv) Since $\bar{y}_{1\cdot} = 9.14$ $\bar{y}_{2\cdot} = 6.29$ $\bar{y}_{3\cdot} = 1.14$ $\bar{y}_{4\cdot} = -1.$[illegible]

$\bar{y}_1 > \bar{y}_2 > \bar{y}_3 > \bar{y}_4$; $\hat{\sigma}^2 = \frac{SS_R}{n-k} = 25$.

$$t_{24,0.025} \cdot \hat{\sigma} \cdot \sqrt{\left(\frac{1}{7}+\frac{1}{7}\right)} = 2.064 \cdot \sqrt{25} \cdot \sqrt{\frac{1}{7}+\frac{1}{7}} = 5.52$$

$\bar{y}_1 - \bar{y}_2 = 2.85$, $\bar{y}_2 - \bar{y}_3 = 5.15$, $\bar{y}_3 - \bar{y}_4 = 3$

$\bar{y}_1 - \bar{y}_2 = 8$ observing that all 3 difference are less than 5.52, we can say they have no significant difference.

(iii) $\hat{\mu}_0 = 119.794$

$se(\hat{\mu}_0) = 10.5989$

95% confidence Interval of μ_0

$\Rightarrow 119.794 \pm 2.228(10.598)$

$\Rightarrow 119.794 \pm 23.6144$

$\Rightarrow (96.17956, 143.4084)$

Sol (3) (i) Comments on Plot:

- The centres of distributions differ for all four cities. Thus there's a prima facie case for suggesting th[e] underlying means are different.
- The difference b/w mean time taken to communic[ate] to office in peak hours & non peak hours are in order city A, city D [highest, lowest].

(ii) Assumptions

→ The population must be normal.

→ The population must have a common variance.

→ The observations are independent.

Probability & stats

Assignment

Sol ① $\Sigma x^2 = 92500$; $\bar{x} = 85$

$\Sigma y^2 = 372717$; $\bar{y} = 173.7$

$\Sigma xy = 182560$

$S_{xx} = \Sigma x_i^2 - n(\bar{x})^2 \Rightarrow 20250$

$S_{yy} = \Sigma y^2 - n(\bar{y})^2 \Rightarrow 71000.1$

$S_{xy} = \Sigma xy - n(\bar{x}\,\bar{y}) \Rightarrow 34915.$

(a) $\beta = \dfrac{S_{xy}}{S_{xx}} = 1.7242.$

$\alpha = \bar{y} - \beta\bar{x} \Rightarrow 27.143$

So, $\boxed{\hat{y} = 27.143 + 1.7242\,x}$

(b) gradient is no of hours he spend in A... upon amount withdrawn.