Ans-2 i] $S_{xx} = \sum x_i^2 - n\bar{x}^2$
$= 301.66$

$S_{xy} = \sum xy - n\bar{x}\bar{y}$
$= 875.16$

$\hat{\beta} = \frac{S_{xy}}{S_{xx}}$

$= 2.901147$

$S_{yy} = \sum y^2 - n\bar{y}^2$
$= 6409.712$

$\alpha = 3.748182$

Equation
$\hat{y} = 3.748182 + 2.901147x_i$

ii] 95% CI

$\hat{\beta} \pm t_{0.025, 10}\sqrt{\frac{\sigma^2}{S_{xx}}}$

$\sigma^2 = \frac{1}{n-2}\left(S_{yy} - \frac{S^2_{xy}}{S_{xx}}\right)$

$= 6155.816$

95 % CI is $(-7.16351, 12.96581)$

Ans-3 i) The variance of all the cities appear to be mostly same. The centres of all distributions differ

iii)

ii) Assumptions
Population must be normal
Must have common variable
Observations are independent

Ans-7 $S_{xy} = 2176.84$

$S_{xx} = \Sigma x_i^2 - n\bar{x}^2$

$= 4789.422$

$S_{yy} = \Sigma y_i^2 - n\bar{y}^2$

$= 1189.208$

i) $\beta = \frac{S_{xy}}{S_{xx}}$

$= 0.45451$

$\alpha = \bar{y} - \hat{\beta}\bar{x}_i$

$= 10.79056$

$\therefore$ Equation

$y = 10.79056 + 0.45451 x_i$

ii] $\sigma^2 = \frac{1}{11-2}\left(S_{yy} - \frac{S^2_{xy}}{S_{xx}}\right)$

$= 22.201$

$H_0 : \beta \neq 0 \quad Vs \quad H_1 : \beta \neq 0$

$$\frac{\hat{\beta} - \beta}{\sqrt{\hat{\sigma}^2 / S_{xx}}} \sim t_{n-2}$$

$$\frac{0.4545}{\sqrt{\frac{22.201}{4789.422}}}$$

$= 6.675675$

$t_{9, 0.025} = 2.262$

Hence, there is a linear relationship

iii] $r = \frac{S^2_{xy}}{\sqrt{S_{xx} S_{yy}}}$

$= 0.912129$