10. Resampling methods.

Simple Linear Regression

x = Input
y = output.

$$y = a + bx$$

Slope (b) $\Rightarrow$

$$\frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - (\Sigma x)^2}$$

Intercept (a) $= \bar{y} - b\bar{x}$

$$\bar{x} = \frac{\Sigma x}{n} \quad \bar{y} = \frac{\Sigma y}{n}$$

X	Y
1400	245
1600	312
1700	279
1875	308
2000	358

$b = n = 5$

$\sum x = 1400 + 1600 + 1700 + 1845 + 2000$

$= 8575$

$\sum y = 245 + 312 + 279 + 324 + 358$

$= 1518$

$\sum xy = (1400 \times 245) + (1600 \times 312) + (1700 \times 279)$
$+ (1875 \times 324) + (2000 \times 358)$

$= 343000 + 499200 + 474300 + 607500$
$+ 716000$

$= 2640000$

$\sum x^2 = (1400)^2 + (1600)^2 + (1700)^2 + (1875)^2 + (2000)^2$

$= 1960000 + 2560000 + 2890000$
$3515625 + 4000000$

$= 13155625$

$$b = \frac{5(2640000) - (8575)(1518)}{5(13155625) - (8575)^2}$$

$$b = \frac{5(2640000) - (8575)(1518)}{5(18155625) - 73530625}$$

$$b = \frac{13200000 - 13016850}{90778125 - 73530625}$$

$$b = \frac{183150}{7752500} = 0.023$$

$$b = 0.023$$

$$a = \bar{Y} - b\bar{X}$$

$$\bar{Y} = \frac{\sum Y}{n} = \frac{1518}{5}, \quad \bar{X} = \frac{\sum x}{n} = \frac{8575}{5}$$

$$= 303.6 \qquad = 1715$$

$$a = 303.6 - (0.023)(1715)$$

$$303.6 - 39.445$$

$$a = 264.155$$

$$303.6 - 0.023 \times 1715$$

$y = a + b$

$= 264.155 + 0.023 (1400)$

$= 264.155 + 32.2$

$= 296.355$ Ans..

$a = 303.6 - 0.023(1715)$

$= 303.6 - 39.445$

$= 264.155$