

2.6 a) Soda Sales & Temperature

$$\hat{y} = -240 + 8x$$

Slope = 8

Intercept = -240.

As the temperature increases by 1 degree of the soda will increase by 8 units because of the linear relationship between temperature & sales.

(b) temp = 80

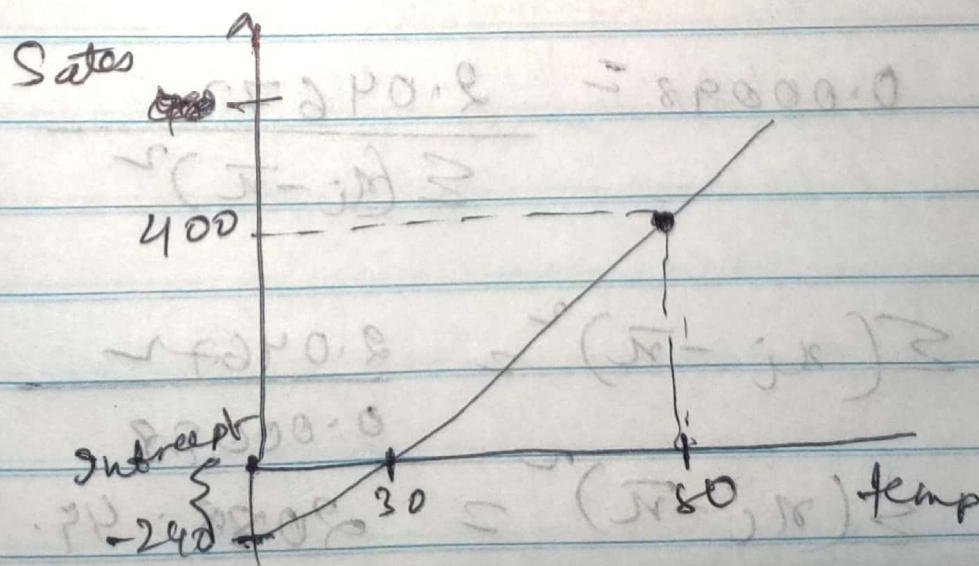
$$\begin{aligned} \text{Sales} &= -240 + 8 \times 80 \\ &= -240 + 640 = 400 \end{aligned}$$

(c) Sales = -240 + 8 \times temp

$$0 = -240 + 8 \times \text{temp}$$

$$30 \times 8 = 240$$

$$\therefore \boxed{\text{temp} = 30}$$



(2.7) $N = 51$

(a) $e^2 = (N-2) \sigma^2$ (Since our sample is small)

$$e^2 = (51-2) \times 2.04672$$

$$= 49 \times 2.04672$$

$$= 100.29128$$

(b) Estimated Variance of $b_2 = 0.00098$

$$se(b_2) = \sqrt{\text{Variance}(b_2)}$$

$$= \sqrt{0.00098}$$

$$= 0.031305$$

$$\text{Var}(b_2) = \frac{\sigma^2}{\sum (x_i - \bar{x})^2}$$

$$0.00098 = \frac{2.04672}{\sum (x_i - \bar{x})^2}$$

$$\sum (x_i - \bar{x})^2 = \frac{2.04672}{0.00098}$$

$$\sum (x_i - \bar{x})^2 = 2088.49$$

(c) If percentages of males increases by 1 unit, the state's mean income of males increases by 0.18 (in thousand of dollars)

(d) $\bar{x} = 69.139$
 $\bar{y} = 15.187$

$$\bar{y} = b_0 + b_1 \bar{x}$$

$$15.187 = b_1 + (0.18 \times 69.139)$$

$$15.187 = b_1 + 12.445$$

$$b_1 = 15.187 - 12.445$$

$$b_1 = 2.742$$

(e) $\sum (x_i - \bar{x})^2$ is a measure of the spread of the data. It is the sum of the squared deviations from the mean. The larger the value, the more spread there is in the data.

$$(f) \hat{e} = y_i - \hat{y}_i$$

$$= y_i - 2.742 - 0.18 \times 58.3$$

$$= 12.274 - 2.742 - 0.18 \times 58.3$$

$$= -0.962$$

Q.10) (a) It is a simple linear relationship between the dependent and the independent variable

$$\text{Let's take } y = r_j - r_f$$

$$x = r_m - r_f$$

$$b_1 = \alpha_j, b_2 = \beta_j \cdot 21 \Rightarrow \text{noise}$$

$$y = b_1 + b_2 x + e$$

(b) Most aggressive firm (is Microsoft) because it has the highest β value and the defensive firm is XON because of the least β value.

(c) Intercept is ~~almost~~ almost equal to zero
ie. 0.00257. So we can say the
model is almost correct.

(d) The beta values do not change even if
we ~~do~~ put the intercept = 0.

2.14)

(a) The association is positive as we can
see from the plot.

(b) $\text{vote} = 51.6908 + 0.6848 \times \text{growth}$
When we increase growth rate by 1
unit the vote will increase by 0.6848
unit

(c) $\text{Vote} = 46.6$
 $\text{growth} = 0.22$
 $\hat{\text{Vote}} = 51.6908 + 0.6845 \times 0.22$
 $= 51.8348$

(d) Model inflation vs vote

$$\text{Vote} = 53.2999 - 0.4502 \times \text{inflation}$$

When we increase inflation by 1 unit
vote will decrease by 0.4502.