PROBLEMS FROM THE TEXTBOOK

1.2 $Y = 300 + 2X$ Functional Relationship

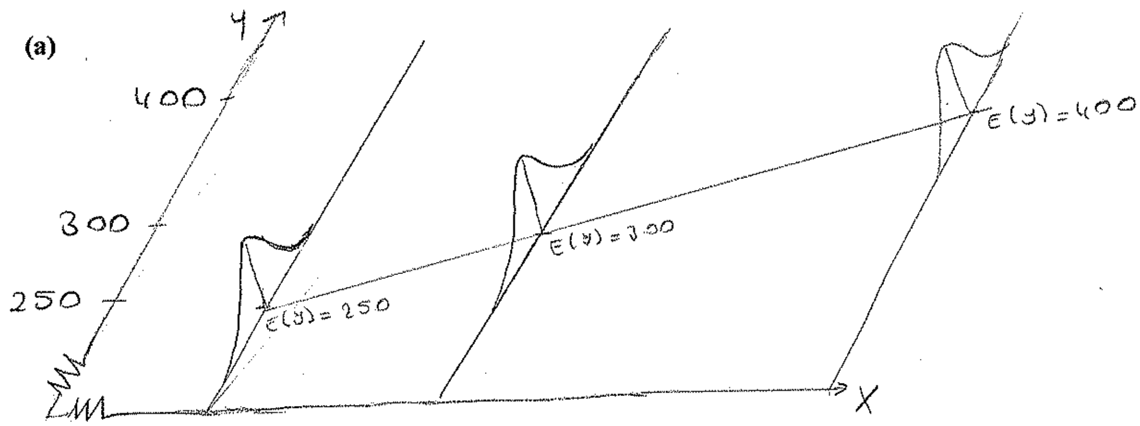
1.4 $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$ (1.1)

The difference in Y values for the same X value is illustrated by ε_i(random error) in the regression model (1.1)

1.5 Disagree,
Since $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$ (1.1)
and according to this model,

$E(Y_i) = E(\beta_0 + \beta_1 X_i + \varepsilon_i)$ where $E(\varepsilon_i) = 0$, so $E(Y_i) = \beta_0 + \beta_1 X_i$

1.6 **(a)**



(b) β_0 is the Y intercept of the regression line, since the scope of the model includes X=0, β_0 gives the mean of the probability distribution of Y at X=0
β_1 is the slope of the regression line.

1.8 $E(Y_i)$ will still be the same since $E(Y_i) = 9.5 + 2.1(45) = 104$ but value of Y_i depends on the value of ε_i of the new observation so it may change.

1.29 The y-intercept for this regression is zero, so the regression function would plot as a line through the origin with slope b_1.

1.30 The slope for this regression is zero, so the regression function would be a horizontal line at a height of b_0.

1.33 Minimize Q

$$Q = \sum_{i=1}^{n} \varepsilon_i = \sum_{i=1}^{n} (Y_i - \beta_0)^2$$

$$\frac{dQ}{d\beta_0} = -2\sum_{i=1}^{n} (Y_i - \beta_0) = 0$$

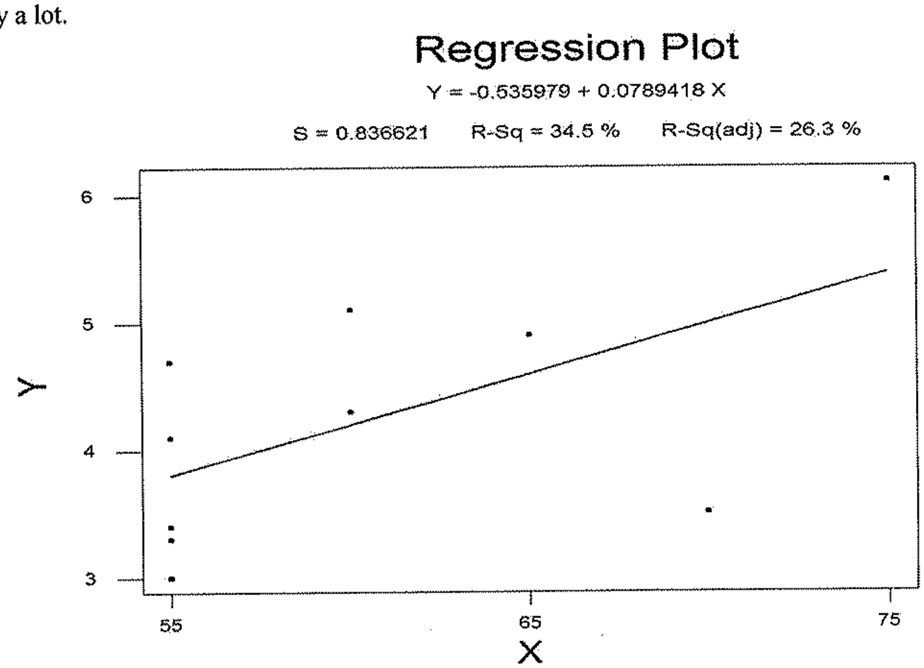
$$\hat{\beta}_0 = \frac{\sum_{i=1}^{n} Y_i}{n} = \bar{Y}$$

1.34 $E[\hat{\beta}_0] = E[\bar{Y}] = \frac{\sum_{i=1}^{n} E(Y_i)}{n} = \beta_0$. where $E(Y_i) = \beta_0$

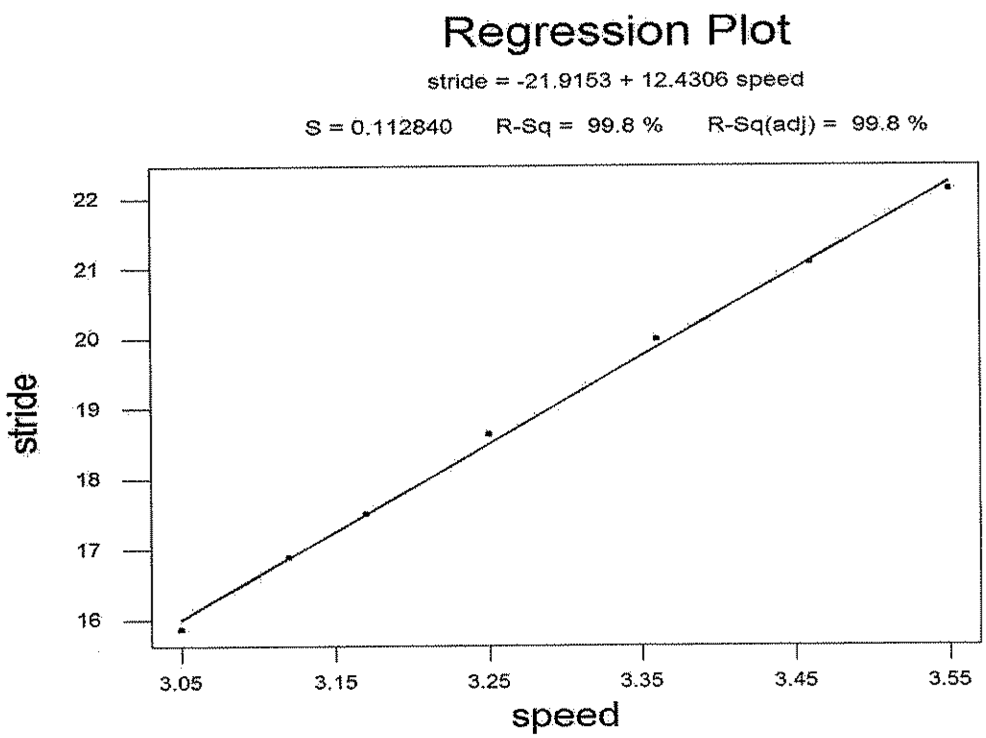
PROBLEMS FROM FIRST LAB NOTES

C5 No, there would be no error in max speed limit in each country. That would be well documented.

D5 Vary a lot.



E4 Little.


Regression Plot
stride = -21.9153 + 12.4306 speed
S = 0.112840 R-Sq = 99.8 % R-Sq(adj) = 99.8 %
stride
22
21
20
19
18
17
16
3.05
3.15
3.25
3.35
3.45
3.55
speed