Chap 9

1) Only i) should be summarized
   by k: ii) has an outlier
   iii) has two separate groups

2) a) False. This means we have a negative association,
    so below average values of the dependent variable are associated
    with above average values of the independent variable
   b) False. For example:

   \[
   \begin{array}{ccc}
   x & y \\
   2 & 3 \\
   3 & 2 \\
   4 & 3 \\
   \end{array}
   \]

   \[
   r = 1
   \]

4. a) False - need to look at scatter plot to tell
   b) False - same reason

6. No. We can see that to go from i) to ii) we just add 3 to each element of x. This addition
of a constant should not change the correlation.

8. False. Correlation does not imply causation. Education levels have increased over time which can account for this association.
3. False. Though the regression effect we expect observatories that are more extreme in one variable to be less extreme in the other. So if a student is at the 65th percentile in GPA, we would expect this student to be closer to 50th percentile on SAT.

2. a) $Z_{15} = \frac{115-100}{15} = 1$

Then estimate Z-score:

$$Z = 1 \cdot Z_{15} = 0.8$$

Estimated value

$$z_{value} = Z - sd + \text{mean}$$

$$= 0.8 \cdot 15 + 100$$

$$= 112$$

b) 112 - our best guess for an individual is the average score for the group.

3. a) $Z_{72} = \frac{72-68}{2.7} = 1.48$ (0.25) $\text{Predicted value} = (0.25)2.7 + 63 = 64$

b) $Z_{64} = \frac{64-68}{2.7} = -0.37$ (0.35) $\text{Predicted value} = (0.35)2.7 + 63 = 62$

c) $Z_{68} = \frac{68-68}{2.7} = 0$ (0.35) $\text{Predicted value} = 0.35 + 63 = 63$

d) $Z_{mean} = 0$ (mean is best estimate)

Predicted value $= (0.35) + 63 = 63$
10. R U 4. a) \( Z_{18} = \frac{18-12}{3} = 2 \) Predicted \( Z = 2, 0.5 = 1 \) Predicted value = \( 1.3 + 12 = 13.5 \) years

b) \( Z_{15} = \frac{15-12}{3} = 1 \) Predicted \( Z = 1, 0.5 = 0.5 \) Predicted value = \( (0.5)^3 + 12 = 13.5 \) years

c) This is just the regression effect. On average, people tend to marry individuals closer to average levels of schooling.

11. A) 4. a) Close to 0.2
b) Close to 1
  c) Close to 5

8. a) £30,000 = Just the 50% for wives income
b) The horizontal line. This is the line where we predict wives income equal to £30,000

1. Percentage over 68 in? \( Z = \frac{68-63}{3} = 2 \)

a) \[
\begin{array}{c}
\text{63} \quad 68 \\
\end{array}
\]

\[
\begin{array}{c}
\text{z = 0} \quad \text{b = 0.5} \\
\text{95%} \quad 2.5
\end{array}
\]

\[
\frac{\text{about 2.5%}}{2.5}
\]

b) Average height of men married to 6 foot men? (72, 4.9)
\( Z = \frac{72-68}{4.9} = 1.48 \) Predicted z score = \( 1.48 \times 0.25 = 0.37 \)

Average height of women \( \rightarrow (0.37)2.5 + 63 = 63.9 \) in
new sd = \( \sqrt{1-0.25} \times \text{sdwomen} = 2.4 \)
\( Z = \frac{68-63.9}{2.4} = 1.21 \) 4% \[\text{about 4%}\]
4. Final Final

4. Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Final

Fina
1. slope: \( \frac{30}{50} = 0.6 = 1.2 \)

\[ \text{Intercept} = 55 - 1.2 \cdot 20 = -2.9 \]

Predicted final score = midterm score \( \times 1.2 \) = 29

4. a) RMS error squared 1. Roughly 2/3 of points are within 1 from the line

b) No. The points have a negative association so the regression line will slope down

7. We know regression line goes through point of \((4, 4)\).

\[ 4 = \text{slope} \times 4 + \epsilon \]

\[ \text{slope} = \frac{4 - \epsilon}{4} = \frac{1}{2} \]

\[ \text{slope} = 0.5 \]