MTH 154 Homework #7 Key

1. a. The fit to the regression line is perfect (and slope is positive)

   b. There is no linear relationship

   c. the same as (a) except slope is negative

2. Because correlation describes a linear relationship. There is no general upward or downward trend to the overall data and so, no linear correlation. Slope of regression line is zero.

3. a. Strong ~.8 (negative) linear appropriate, no outliers

   b. moderately weak ~.3 linear appropriate, some low outliers

   c. basically zero.

   d. weak -.2 linear is not appropriate

   e. weak, near zero not enough data to be sure

4. The correlation is negative means that the more students that take the SAT, the lower the scores in that state. Only elite students take SATs in some states. The ability to predict average score is pretty strong. $r^2 = (-.843)^2 = 0.7106\ldots$ 71% of variability explained by proportion of students taking the test.

5. for each 1 pt. IQ increase, GPA increases by an average of 0.1 points.

   3.055

6. The straight line w/ zero slope predicts the average y-value and does not change based on x. Thus, it can't give any info to improve the prediction over the mean.

7. $\sqrt{0.25} = 0.5 = r$

8. no. it more likely means the people started using low cal. (2)
dressing after already gaining the weight.

9. Students that live on campus may also be younger, more accustomed to studying as they are fresh out of high school, and since living on campus is expensive, may come from a family wealthy enough to support them w/o working. Students living off campus may also need to work or have other obligations that living on campus would not solve.

10. answers will vary.
we must assume the trend of the past will continue in the future (and that is extremely unlikely when looking at the federal budget).

11. a. i. See Excel.
ii. non-linear
iii. NA
iv. 65.68%
v. answers will vary
vi. more than 60 sec. say 100 sec.
vii. exponential model is extremely strong
viii. no.

b. ii non-linear i. See Excel
iii. NA.
iv. 0
v. answers will vary.
vi. more than 10 days
vii. quadratic model very strong
viii. no.

11 cont'd.

C. i. See Excel.

ii. linear

iii. $y = 3.2911x + 25.232$, $r = 0.835$

iv. $r^2 = 69.75\%$

v. answers will vary

vi. temp less than 65°; chirps less than 14 or more than 20

vii. strong

viii. no

d. i. See Excel

ii. linear

iii. $y = 25.326x + 353.16$ $r = 0.93336$

iv. 87.16%

v. answers will vary

vi. study time over 20-25 hrs.

vii. Strong

viii. the last value appears influential (study time of 22 hrs)

e. i. See Excel

ii. linear

iii. $y = 0.1098x + 98.248$, $r = 0.7621$

iv. 58.08%

v. answers will vary. vi. not bigger than 2500 sq. ft. or smaller than 1000

vii moderate-strong

viii. no.

12a. non constant variance but linear might be ok. positive, too many

b. linear, negative, no

c. non-linear, negative, no

d. linear, no correlation, no.

e. linear w/ outliers, or non-linear w/o, positive.

13. a, b. See Excel. c. −0.9596 d. negative e. linear

f. See Excel. g. for each additional pound of weight, we can expect MPG to decrease by 0.0069 miles per gallon h. 92.1% of variability in MPG explained by weight