STA 207 HW-3
Due Date: Sept. 19, by 10:20AM in Moodle

Problem 1: Fluorescence Experiment (45 points)

Suzanne Rohrback used a novel approach in a series of experiments to examine calcium-binding proteins. The variable Calcium is the log of the free calcium concentration and ProteinProp is the proportion of protein bound to calcium.
You may access the data by running the following R code in RStudio:

```
library(Stat2Data)
data("Fluorescence")
?Fluorescence  #this line gives you the details of the dataset
```

a. [5 points] Report the correlations between the two variables, Calcium and ProteinProp through correlation coefficient and comment on the strength and direction of the relation.
b. [5 points] Make a scatter plot with Calcium as X and ProteinProp as Y. Comment on the relationship.
c. [5 points] Fit an SLR for predicting the proportion of protein bound to calcium using the log of the free calcium concentration. Report the fitted model.
d. [5 points] Plot the regression line and all the points on a scatterplot. Does it seem to be a good fit?
e. [5 points] Interpret the slope estimate.
f. [5 points] Report the standard errors for regression parameter estimates and interpret them.
g. [15 points] Is this model a good fit. Justify?

Problem 2 (15 points)

To determine whether there is a relationship between Math SAT scores and the number of hours spent studying for the test? A study was conducted involving 20 students as they prepared for and took the Math section of the SAT Examination. The regression output for the study is shown below:

Coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(>|t|)**
(Intercept)	353.165	24.337	14.51	2.24e-11 ***
x	-	2.291	11.05	1.87e-09 ***

Answer the following:

(a) [5 points] Compute the slope estimate. Interpret the slope.
(b) [5 points] How much variability is there in the above estimate?
(c) [5 points] Based on this estimate, is there a positive relation between math SAT score and number of hours of study. Justify.

Problem 3 (15 points)

The city's transportation department is interested in studying the relationship between the temperature and number of passengers that ride the main bus line in order to better serve their customers. The manager recorded the temperature (in Fahrenheit) at the beginning of the hour, and then had a bus driver record the number of passengers that boarded the bus throughout the hour. Their findings are listed below:

Temperature	**Passengers**

42	173
37	149
46	185
30	123
50	201
43	174
43	175
46	188
46	186
49	198

The manager wishes to predict the number of passengers using the temperature.

(a) [5 points] Describe the relation between temperature and the number of passengers? Use scatterplot and correlation coefficient.

(b) [5 points] Obtain the least squares regression equation and report it.

(c) [5 points] Find residual for temperature=42 degrees Fahrenheit and passengers=173.

Problem 4 [25 points]

Two undergraduate students took a random sample of 30 textbooks from the campus bookstore. They recorded the price and number of pages in each book, in order to investigate the question of whether the number of pages can be used to predict price. The data can be accessed by running:

```
install.packages(Stat2Data)
library(Stat2Data)
data("TextPrices")
?TextPrices
```

a. [2.5 points] Produce a scatterplot to investigate the students' question. What does the plot reveal?

b. [7.5 points] What is the fitted model equation for predicting price from number of pages. Make a scatterplot with overlayed fitted line and comment on the fit.

c. [15 points] Is this a good model? Justify.