Homework Assignment # 5

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Problem 1

A company sets different prices for a particular stereo system in eight different regions of the country. The table below shows the numbers of units sold (in 1000s of units) and the corresponding prices (in hundreds of dollars).

Sales	420	380	350	400	440	380	450	420
Price	5.5	6.0	6.5	6.0	5.0	6.5	4.5	5.0

(i) In Excel, regress sales on price and obtain the intercept and slope estimates.

(ii) Present a plot with the data and the regression line

(iii) Based on this analysis, briefly describe your understanding of the relationship between sales and prices.

Problem 2: Match the Plots

Below (Figure 1) are 4 different scatter plots of an outcome variable y versus predictor x followed by 4 four regression output summaries labeled A, B, C and D. Match the outputs with the plots.

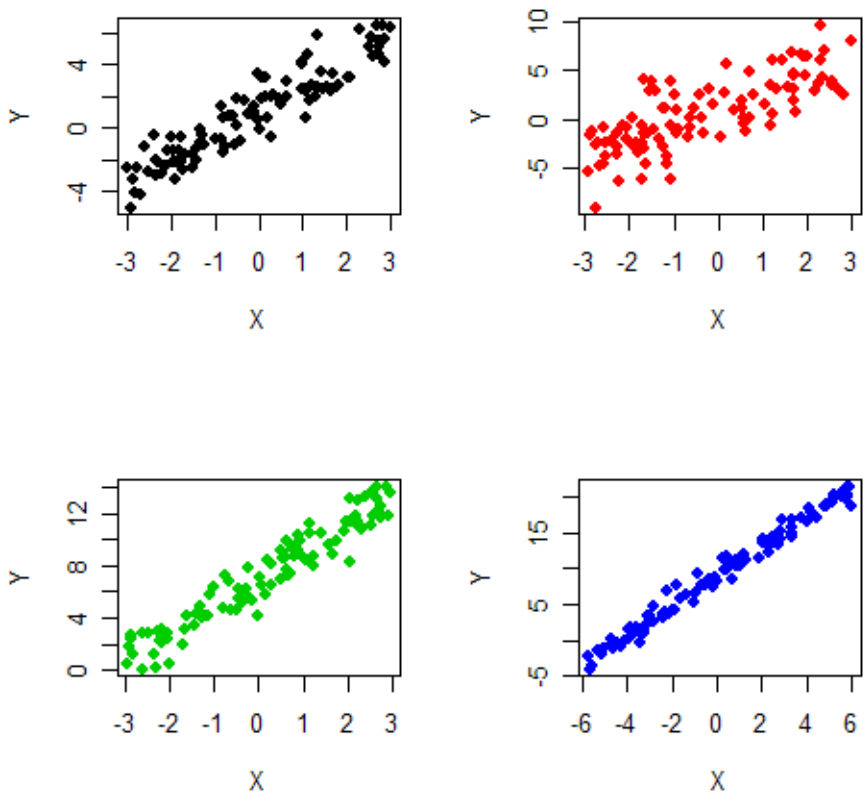

Figure 1: Scatter Plots

Regression A:

```
Coefficients:
                  Estimate   Std. Error
(Intercept)        7.03747    0.12302
(Slope)            2.18658    0.07801
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Residual standard error: 1.226
R-Squared: 0.8891
```

Regression B:

```
Coefficients:
                  Estimate   Std. Error
(Intercept)        1.1491    0.1013
(Slope)            1.4896    0.0583

Residual standard error: 1.012
R-Squared: 0.8695
```

Regression C:

```
Coefficients:
                  Estimate   Std. Error
(Intercept)        1.2486    0.2053
(Slope)            1.5659    0.1119

Residual standard error: 2.052
R-Squared: 0.6666
```

Regression D:

```
Coefficients:
                  Estimate   Std. Error
(Intercept)        9.0225    0.0904
(Slope)            2.0718    0.0270
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Residual standard error: 0.902
R-Squared: 0.9835
```

Problem 3

Suppose we are modeling house price as depending on house size. Price is measured in thousands of dollars and size is measured in thousands of square feet.
Suppose our model is:

$$P = 20 + 50\,s + \epsilon, \quad \epsilon \sim N(0, 15^2).$$

(a) Given you know that a house has size $s = 1.6$, give a 95% predictive interval for the price of the house.

(b) Given you know that a house has size $s = 2.2$, give a 95% predictive interval for the price.

(c) In our model the slope is 50. What are the units of this number?

(d) What are the units of the intercept 20?

(e) What are the units of the the error standard deviation 15?

(f) Suppose we change the units of price to dollars and size to square feet
What would the values and units of the intercept, slope, and error standard deviation?

(g) If we plug $s = 1.6$ into our model equation, P is a constant plus the normal random variables ϵ. Given $s = 1.6$, what is the distribution of P?