Problem set 2

Professor McNamara

Exercises to hand in: 1.16, 1.20, 1.22

For this (and all other homework assignments), I am expecting a mixture of text, code, and output.

As you work, I suggested knitting your document frequently to see if you encounter errors. You need to upload the knitted PDF document of your finished homework. This means you should:

- Knit your document and look at the preview to make sure it looks good
- Close the preview document
- Go to the Files tab of your RStudio and find the file that ends in .pdf (for this assignment, probably problemset1.pdf)
- Upload the PDF file to Gradescope

1.16 Glow worms

```
data("GlowWorms")
```

a. Fit the regression of Eggs on Lantern. What is the fitted regression model?

```
fittedRegressionModel<-lm(Eggs ~ Lantern, data = GlowWorms)
summary(fittedRegressionModel)
```

```
Call:
lm(formula = Eggs ~ Lantern, data = GlowWorms)

Residuals:
```

```
   Min     1Q Median     3Q    Max
-69.50 -23.59  -3.20  22.95  63.33

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   -8.977     21.869  -0.410 0.685087
Lantern        7.325      1.757   4.169 0.000343 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 32.71 on 24 degrees of freedom
Multiple R-squared:  0.4201,    Adjusted R-squared:  0.3959
F-statistic: 17.38 on 1 and 24 DF,  p-value: 0.0003431
```

Eggs hat =-8.977 +7.325*lantern

b. Interpret the coefficient of Lantern in the context of this setting.

For a 1 unit increase in the lantern, we would expect a 7.325 increase in the number of eggs laid.

c. Suppose a glow-worm has a lantern size of 14 mm. What is the predicted number of eggs she will lay?

The predicted number of eggs that she will lay would be 93.573.

```
-8.977+7.325*14
```

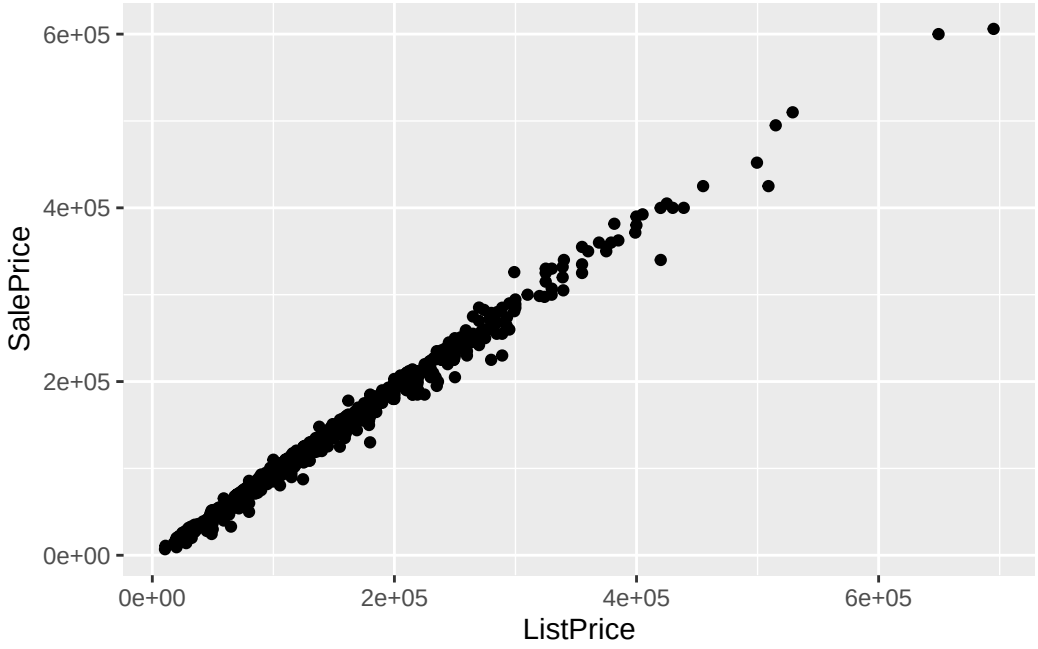
```
[1] 93.573
```

1.20 Houses in Grinnell, CHOOSE/FIT.

```
data("GrinnellHouses")
```

a. Make a scatterplot with ListPrice on the horizontal axis and SalePrice on the vertical axis. Comment on the pattern.

```
ggplot(data=GrinnellHouses) + geom_point(aes(x = ListPrice, y = SalePrice))
```



b. Find the least squares regression line for predicting sale price of a home based on list price of that home.

```
m2= lm(SalePrice ~ ListPrice, data = GrinnellHouses)
summary(m2)
```

```
Call:
lm(formula = SalePrice ~ ListPrice, data = GrinnellHouses)

Residuals:
   Min     1Q Median     3Q    Max
-55942  -3275    846   4141  44168

Coefficients:
```

```
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.448e+02  5.236e+02  -0.277    0.782
ListPrice    9.431e-01  3.201e-03 294.578   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 8019 on 927 degrees of freedom
Multiple R-squared:  0.9894,    Adjusted R-squared:  0.9894
F-statistic: 8.678e+04 on 1 and 927 DF,  p-value: < 2.2e-16
```

c. Interpret the value (not just the sign) of the slope of the fitted model in the context of this setting.

For $1 increase in list price we would expect a $?0.9431 increase in the sale price.

1.22 Grinnell houses, ASSESS

a. What sales price would the fitted model predict for a house that has a $99,500 listing price?

```
0.9431 * 99500 -144.8329
```

```
[1] 93693.62
```

b. The house at 1317 Prince Street has a listing value of $99,500 and a sales price of $95,000. Find the residual for this data point.

```
95000-93693.62
```

```
[1] 1306.38
```

c. Does the linear regression model appear to be a good summary of the relationship between list price and sales price for houses in Grinnell, Iowa?

Yes the linear regression model does make a good summary between list price and sale price for the houses in Grinnell, Iowa, because as the list price increases the sale prices does increase as well, making a positive linear model.