

STAT 217: Quiz 21

```
cricket <- read.csv("~/Documents/Stat217Fall2014/quizzes/Quiz21/slr02.csv",
                    ,head=T)
```

```
lm.chirp <- lm(chirps~temp, data=cricket)
summary(lm.chirp)
```

```
##
## Call:
## lm(formula = chirps ~ temp, data = cricket)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5601 -0.5793  0.0313  0.5902  1.5326
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.3091      3.1086  -0.10  0.92230
## temp           0.2119      0.0387   5.47  0.00011
##
## Residual standard error: 0.972 on 13 degrees of freedom
## Multiple R-squared:  0.697, Adjusted R-squared:  0.674
## F-statistic: 30 on 1 and 13 DF, p-value: 0.000107
```

1. Write the hypotheses being tested in the intercept row.

$$H_0: \beta_0 = 0$$

$$H_1: \beta_0 \neq 0$$

2. Write the hypotheses being tested in the temp row.

$$H_0: \beta_1 = 0$$

$$H_A: \beta_1 \neq 0$$

```
confint(lm.chirp)
```

```
##              2.5 % 97.5 %
## (Intercept) -7.025  6.407
## temp         0.128  0.296
```

3. Write an "It is estimated" statement for the slope coefficient in the table above. Use the 95% confidence interval given.

For a one degree increase in temperature, the mean number of chirps is estimated to change by 0.2119, with a 95% CI from 0.128 to 0.296.

```
predict(lm.chirp, interval="confidence", level=0.95)
```

```
##      fit   lwr   upr
## 1  18.5  17.6  19.4
## 2  14.9  14.0  15.8
## 3  19.5  18.2  20.7
## 4  17.6  16.9  18.2
## 5  16.8  16.2  17.3
## 6  15.6  15.0  16.3
## 7  14.5  13.4  15.5
## 8  17.1  16.5  17.6
## 9  14.4  13.4  15.4
## 10 17.3  16.7  18.0
## 11 16.6  16.0  17.1
## 12 17.2  16.6  17.8
## 13 16.8  16.2  17.3
## 14 17.4  16.8  18.0
## 15 15.9  15.2  16.5
```

Assume row 6 is 60°F

4. Interpret the confidence interval in row 6 above.

For crickets living in a temperature of 60°F, ~~the mean~~ we are 95% confident that the true mean number of chirps is between 15.0 and 16.3.

```
predict(lm.chirp, interval="prediction", level=0.95)
```

```
## Warning: predictions on current data refer to future responses
```

```
##      fit   lwr   upr
## 1  18.5  16.2  20.8
## 2  14.9  12.6  17.1
## 3  19.5  17.0  21.9
## 4  17.6  15.4  19.8
## 5  16.8  14.6  18.9
## 6  15.6  13.4  17.8
## 7  14.5  12.1  16.8
## 8  17.1  14.9  19.2
## 9  14.4  12.1  16.7
## 10 17.3  15.2  19.5
## 11 16.6  14.4  18.7
## 12 17.2  15.0  19.4
## 13 16.8  14.6  18.9
## 14 17.4  15.2  19.6
## 15 15.9  13.7  18.1
```

5. Interpret the prediction interval in row 6 above.

For a new cricket at 60°F, we are 95% confident that ~~the~~^{its} number of chirps ² will be between 13.4 and 17.8.