

STAT 217: MLR Test for an Interaction (4-24)

1. Crab Claw Force and Size: Refer back to the separate lines worksheet you completed on Wednesday. Do you think there is an interaction between height and species in the crab data? Why or why not?
2. Conduct a hypothesis test for an interaction with the crab data. The ANOVA table for the interaction model is shown below.

```
separate.out <- lm(Force ~ Height*Species, data=crab.data)
anova(separate.out)
```

```
## Analysis of Variance Table
##
## Response: Force
##           Df Sum Sq Mean Sq F value    Pr(>F)
## Height      1  1273    1273    64.43 3.7e-09
## Species     2   736     368    18.62 4.3e-06
## Height:Species 2   342     171     8.64  0.001
## Residuals  32   632      20
```

- (a) What are the hypotheses?
- (b) Report the test statistic and the distribution it follows under the null hypothesis.
- (c) Report the p-value and your decision.
- (d) Write a conclusion in the context of the problem.

3. The table of coefficients for the interaction model is shown below. Compare and contrast the ANOVA table (above) and the table of coefficients (below).

```
summary(separate.out)

##
## Call:
## lm(formula = Force ~ Height * Species, data = crab.data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -7.146 -2.100 -0.501  1.841 13.094
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    -17.252     6.096   -2.83  0.0080
## Height           3.849     0.723    5.32 7.8e-06
## Speciesnudus    20.413     7.794    2.62  0.0134
## Speciesproductus  8.248     9.394    0.88  0.3865
## Height:Speciesnudus -3.704     0.936   -3.96  0.0004
## Height:Speciesproductus -1.169     0.989   -1.18  0.2459
##
## Residual standard error: 4.45 on 32 degrees of freedom
## Multiple R-squared:  0.788, Adjusted R-squared:  0.755
## F-statistic: 23.8 on 5 and 32 DF,  p-value: 6.42e-10
```