Statistician: Marina Hein Version: F

#### **Directions**

The final exam will consist of several application-type questions related to the following topics we've covered this semester – univariate EDA (quantitative & categorical), bivariate EDA (quantitative & categorical), linear regression, one-sample t-test, two-sample t-test, and chi-square. On the final exam, you will be asked to answer each question from results that you have prepared prior to the exam using R.

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Failure to follow all of these criteria will result in a 0 for the final exam (29% of your overall grade)!!

## Data Set - LaysanFinch

- 1. Univariate EDA for beak length, sternum length, and location.
- 2. Bivariate EDA for tarus length and length of the lower mandible, tarsus length and sternum length.
- 3. Linear regression results (equation results and r<sup>2</sup>) for predicting weight from beak length.
- 4. Results for testing the following research hypotheses (use 5% level for each)
  - a. The mean sternum length is different between male and female finches.
  - b. The distribution of individuals into the three locations differs between male and female finches.
  - c. The mean tarsus length for male finches is greater than 2.6 cm.

Version: F Statistician: Marina Hein

### **Directions:**

You may have a pencil, a calculator, and your R output document for the **LaysanFinch.txt** file on your desk. All other materials should be fully stored out of sight and your computer should be turned off.

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### 11 Steps for any Significance Test

- 1. **[1]** state the rejection criterion ( $\alpha$ ),
- 2. [2] state the null and alternative hypotheses to be tested define the parameter,
- 3. [1] determine which hypothesis test to use thoroughly explain why,
- 4. [1] collect the data (address type of study and randomization),
- 5. [2] check all necessary assumptions explain how you tested the validity,
- 6. [1] calculate the appropriate statistic(s),
- 7. [2] calculate the appropriate test statistic,
- 8. [2] calculate the p-value,
- 9. [1] state rejection decision,
- 10. [2]\* summarize your findings in terms of the problem, and
- 11. [2]\* If reject  $H_0$ , compute a 100(1- $\alpha$ )% confidence region for the parameter.

- 1. [3pts] Identify what type of variable each of the following is: weight, bklen, and loc.
- 2. [5pts]\* Perform a thorough EDA for sternum length.
- 3. [2pts]\* Perform a thorough EDA for the location variable.
- 4. [5pts]\* Perform a thorough EDA for the relationship between tarsus length and length of the lower mandible.
- 5. [2pts]\* Interpret the slope of the linear regression that you performed.
- 6. [2pts] Predict the weight of a finch if the beak length equals the median beak length.
- 7. [2pts] What proportion of the total variability in weight is explained by knowing the beak length?
- 8. [15pts] Test that the distribution of individuals into the three locations differs between male and female finches.
- 9. [15 or 17 pts] Test that the mean sternum length is different between male and female finches.
- 10. **[8 pts]\*** Describe the importance of statistics (as a field of study or a collection of methods). Among other things make sure you describe the two major goals of statistics, identify at least three major concepts or ideas of statistics, and identify how some of the "tools" you have learned this semester illustrate or are related to why you think statistics is important.

Statistician: Eric Jinks Version: F

#### **Directions**

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## Data Set - LaysanFinch

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  - b. The distribution of individuals into the three locations differs between male and female finches.
  - c. The mean tarsus length for male finches is greater than 2.6 cm.

Version: F Statistician: Eric Jinks

### **Directions:**

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- 6. [1] calculate the appropriate statistic(s),
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- 5. [2pts]\* Interpret the slope of the linear regression that you performed.
- 6. [2pts] Predict the weight of a finch if the beak length equals the median beak length.
- 7. [2pts] What proportion of the total variability in weight is explained by knowing the beak length?
- 8. [15pts] Test that the distribution of individuals into the three locations differs between male and female finches.
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Statistician: Faye Koosmann Version: F

### **Directions**

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## Data Set - LaysanFinch

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Version: F Statistician: Faye Koosmann

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Statistician: Stephanie Kovach Version: F

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Statistician: Emily Leonard Version: F

### **Directions**

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## Data Set - LaysanFinch

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Version: F Statistician: Emily Leonard

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Statistician: Alec Malenfant Version: F

#### **Directions**

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### Data Set - LaysanFinch

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Version: F Statistician: Alec Malenfant

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Statistician: Casey McCullough Version: F

### **Directions**

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## Data Set - LaysanFinch

- 1. Univariate EDA for beak length, sternum length, and location.
- 2. Bivariate EDA for tarus length and length of the lower mandible, tarsus length and sternum length.
- 3. Linear regression results (equation results and r<sup>2</sup>) for predicting weight from beak length.
- 4. Results for testing the following research hypotheses (use 5% level for each)
  - a. The mean sternum length is different between male and female finches.
  - b. The distribution of individuals into the three locations differs between male and female finches.
  - c. The mean tarsus length for male finches is greater than 2.6 cm.

Version: F Statistician: Casey McCullough

### **Directions:**

You may have a pencil, a calculator, and your R output document for the **LaysanFinch.txt** file on your desk. All other materials should be fully stored out of sight and your computer should be turned off.

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# 11 Steps for any Significance Test

- 1. **[1]** state the rejection criterion ( $\alpha$ ),
- 2. [2] state the null and alternative hypotheses to be tested define the parameter,
- 3. [1] determine which hypothesis test to use thoroughly explain why,
- 4. [1] collect the data (address type of study and randomization),
- 5. [2] check all necessary assumptions explain how you tested the validity,
- 6. [1] calculate the appropriate statistic(s),
- 7. [2] calculate the appropriate test statistic,
- 8. [2] calculate the p-value,
- 9. [1] state rejection decision,
- 10. [2]\* summarize your findings in terms of the problem, and
- 11. [2]\* If reject  $H_0$ , compute a 100(1- $\alpha$ )% confidence region for the parameter.

- 1. [3pts] Identify what type of variable each of the following is: weight, bklen, and loc.
- 2. [5pts]\* Perform a thorough EDA for sternum length.
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- 5. [2pts]\* Interpret the slope of the linear regression that you performed.
- 6. [2pts] Predict the weight of a finch if the beak length equals the median beak length.
- 7. [2pts] What proportion of the total variability in weight is explained by knowing the beak length?
- 8. [15pts] Test that the distribution of individuals into the three locations differs between male and female finches.
- 9. [15 or 17 pts] Test that the mean sternum length is different between male and female finches.
- 10. **[8 pts]\*** Describe the importance of statistics (as a field of study or a collection of methods). Among other things make sure you describe the two major goals of statistics, identify at least three major concepts or ideas of statistics, and identify how some of the "tools" you have learned this semester illustrate or are related to why you think statistics is important.

Statistician: Montana Morris Version: F

### **Directions**

The final exam will consist of several application-type questions related to the following topics we've covered this semester – univariate EDA (quantitative & categorical), bivariate EDA (quantitative & categorical), linear regression, one-sample t-test, two-sample t-test, and chi-square. On the final exam, you will be asked to answer each question from results that you have prepared prior to the exam using R.

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Statistician: John Morrissey Version: F

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