

HW 10 Written Work

● Graded

Student

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Total Points

40 / 40 pts

Question 1

1.1.

8 / 8 pts

✓ + 4 pts Correct null: The true slope of the regression line that predicts bird weight from egg weight, computed using the population of all Snowy Plovers, is 0. If the slope of the regression line computed from our sample isn't 0, that is just a result of the particular birds we have in our sample.

✓ + 4 pts Correct alternative: The true slope of the regression line is not 0.

+ 0 pts Incorrect/Blank

Question 2

1.4

8 / 8 pts

✓ + 8 pts Correct histogram

+ 0 pts Incorrect/blank

Question 3

1.6

8 / 8 pts

✓ + 2 pts Correct answer: We would reject the null

✓ + 4 pts Correct explanation: Because 0 is not within the approximate 95% confidence interval.

✓ + 2 pts Correct cutoff: If we use an approximate 95% confidence interval, we're using a 0.05 cutoff.

+ 0 pts Incorrect/blank

Question 4

1.7

8 / 8 pts

✓ + 8 pts With 95% confidence, we can say that the true slope is somewhere between the *interval calculated*. (The approximate 95% confidence interval that we generate in the experiment not only allows us to make a conclusion about whether the true slope is 0, but also allows us to define a range that the true slope falls in!)

+ 0 pts Incorrect/blank

- 2 pts If they say it is within the interval (without mentioning confidence)

Question 5

2.4

8 / 8 pts

✓ + 8 pts Correct histogram

+ 0 pts Incorrect/blank

Question 1.1. Let's run a hypothesis test using confidence intervals to see if there is a linear relationship between egg weight and bird weight. Define the null and alternative hypotheses that will allow you to conduct this test. **(8 points)**

Note: Please write your answer **in the cell below** in the following format: - **Null Hypothesis:** - **Alternative Hypothesis:**

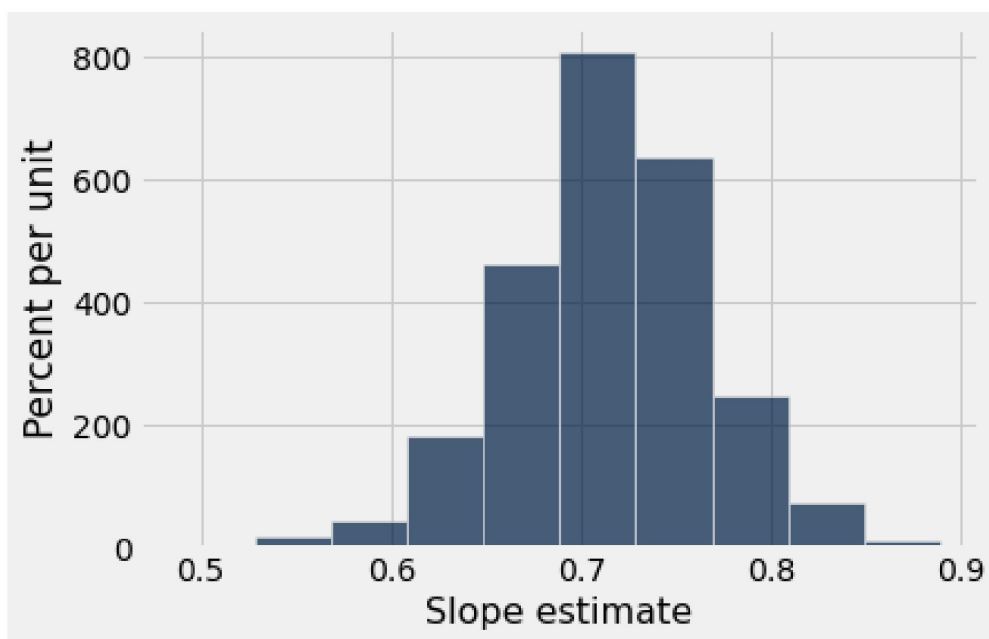
Null Hypothesis: There is no association between egg weight and bird weight. The true correlation is 0.
Alternative Hypothesis: There is relationship between egg weight and bird weight. And the association between them are not 0.

Question 1.4. Create an array called `resampled_slopes` that contains the slope of the best fit line for 1000 bootstrap resamples of `birds`. Plot the distribution of these slopes. (8 points)

```
In [10]: resampled_slopes = make_array()

for i in np.arange(1000):
    birds_bootstrap = birds.sample()
    bootstrap_line = fit_line(birds_bootstrap, "Egg Weight", "Bird Weight")
    bootstrap_slope = bootstrap_line.item(0)
    resampled_slopes = np.append(resampled_slopes, bootstrap_slope)

# DO NOT CHANGE THIS LINE
Table().with_column("Slope estimate", resampled_slopes).hist()
```



```
In [11]: grader.check("q1_4")
```

```
Out[11]: q1_4 results: All test cases passed!
```


Question 1.6. Based on your confidence interval, would you accept or reject the null hypothesis that the true slope is 0? Why? What p-value cutoff are you using? **(8 points)**

Hint: Read the introduction of this homework!

Based on my confidence interval, 95%, we would reject the null that the true slope is 0. Using the p-value cutoff of 0.05, and it's because 0 is not in our range for the 95% confidence interval.

Question 1.7. What do you think the true slope is? You do not need an exact number. How confident are you of this estimate? **(8 points)**

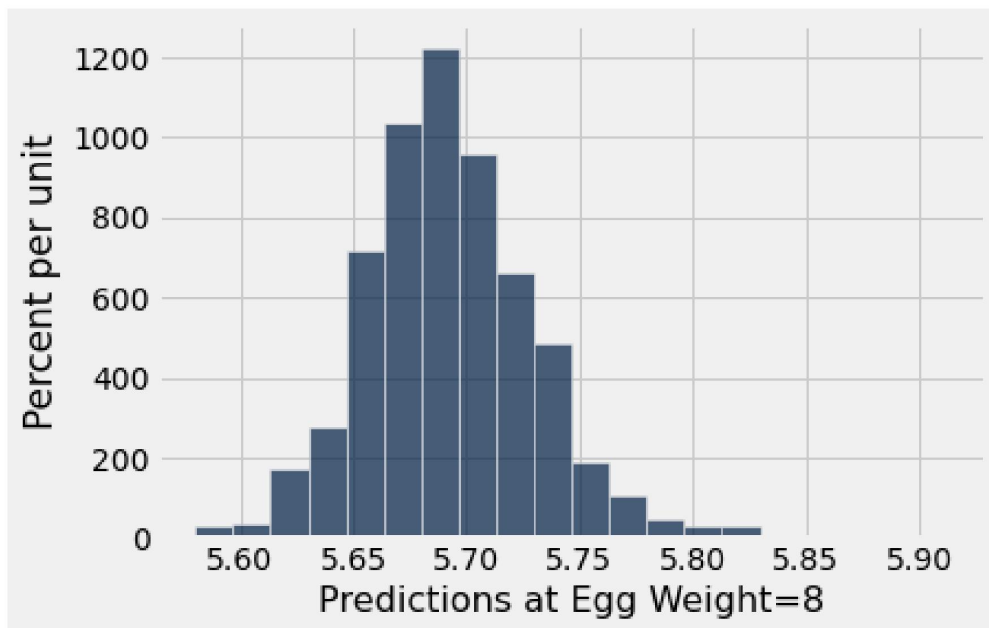
Hint: Can you provide an interval that you think the true slope falls in?

I think the true slope is about 0.71. We can also find that mean and median close to this value, and this is from slope estimation from 1,000 bootstrapped samples. Also, I can say I'm 95% confident of this answer since I was using 95 confidence interval to get the range of it, [0.603565, 0.817153]

Question 2.4. Create an array called `predictions_for_eight` that contains the predicted bird weights based on an egg of weight 8 grams for each regression line in `regression_lines`. (8 points)

```
In [22]: predictions_for_eight = regression_lines.column(1) + regression_lines.column(0) * 8

# This will make a histogram of your predictions:
table_of_predictions = Table().with_column('Predictions at Egg Weight=8', predictions_for_eight)
table_of_predictions.hist('Predictions at Egg Weight=8', bins=20)
```



```
In [23]: grader.check("q2_4")
```

```
Out[23]: q2_4 results: All test cases passed!
```

