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Analysis of Environmental Data  
Lab 6  
October 17, 2021  
Worked with Juliana Berube

Q1: Show the R code you used to define your `sse_mean()` function. Include the following line before your function definition:

```
rm(list = ls())

sse_mean = function(x)
{
  sd(x, na.rm = TRUE) / (sqrt(length(x[!is.na(x)])))
}

sse_mean(penguins$body_mass_g)
sse_mean(mtcars$mpg)
```

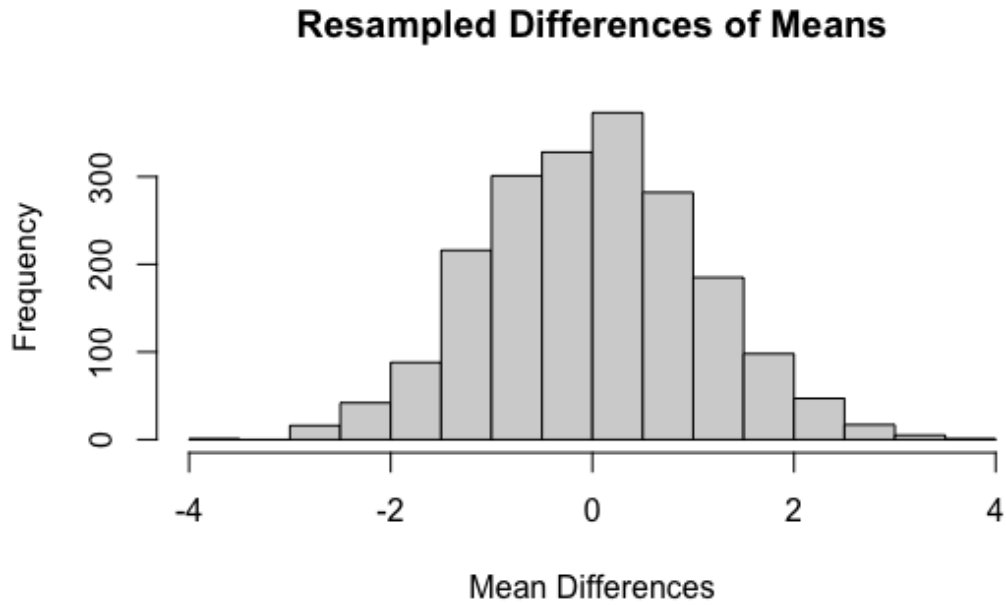
Q2: Include the code you used to define your `two_group_resample()` function into the text input.

```
two_group_resample = function(x, n_1, n_2)
{
  difference_in_means = mean(sample(x, n_1, replace =
TRUE), na.rm = TRUE) - mean(sample(x, n_2, replace = TRUE),
na.rm = TRUE)
  return(difference_in_means)
}
```

Q3: Does your function perform Monte Carlo or bootstrap resampling, i.e. does it simulate a null or an alternative hypothesis?

It performs bootstrap resampling because it keeps the associations (body mass) to each label (species) as the data is resampled over and over again. This simulates an alternative hypothesis test.

Q4: Create histogram of the resampled differences of means



Q5: How many of your resampled differences of means were greater than 5.8?

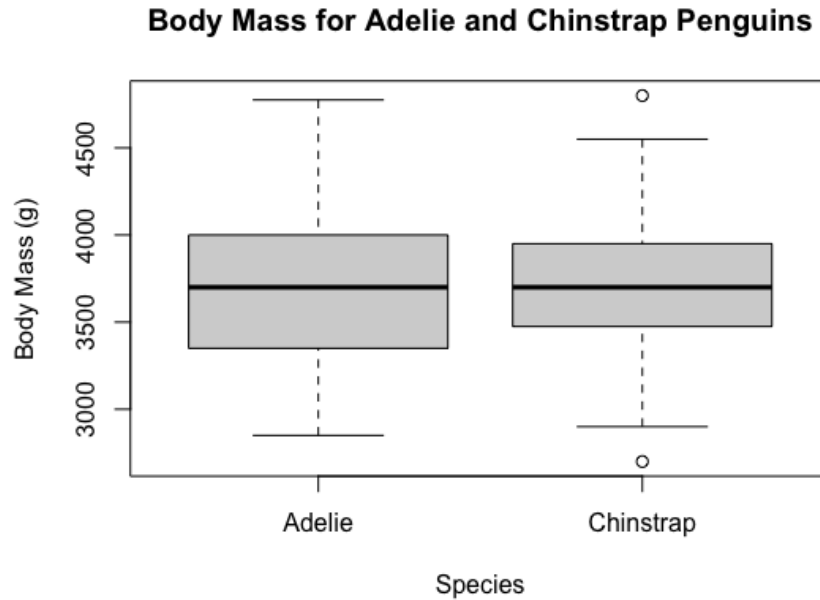
```
sum(abs(mean_differences) >= diff_observed)
```

**There are 0**

Q6: Given a p value of less than 1 per 10 million, how many simulations do you think you would have to do to see a difference in mean flipper length equal to or greater than 5.8 mm?

10 million

Q7: Include a boxplot of your chosen variable in your report.



Q8: Report the group means and difference between the means.

Mean in group Adelie = 3700.662

Mean in group Chinstrap = 3733.088

Difference of means = 32.42598

Q9: Interpret the p-value from the t-test output in plain, non-technical English that a non-statistician would understand.

The p-value = 0.5879. This means there is no difference in body mass between the two species.

Q10: How many differences in means were greater than `diff_crit`?  
Remember to treat this as a 2-tailed test.

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Q11: Include a histogram of your simulation results in your report. Make sure it has appropriate title and labels.

### Resampled Differences of Means

