Name:_____ Date:_____

LAB 2D: Queue it up!
Response Sheet

Directions: Record your responses to the lab questions in the spaces provided.

Where we left off

Back to songs

(1) Write and run code simulating a *playlist of songs* containing 30 `"rap"` songs, 23 `"country"` songs and 47 `"rock"` songs.

(2) Write and run code simulating choosing a single song 50 times. Then use your simulated draws to estimate the probability of choosing a *rap* song.

(3) Write a sentence comparing your estimated probability to the "true" probability.

With or Without?

(4) Write and run code taking a sample of `size` 100 from our playlist of songs *without replacement*. Assign this sample the name `without`.

(5) Run `tally(without)` and describe the output.

(6) Does something similar happen if you sample *with replacement*?

(7) What happens if `size = 101` and `replace = FALSE`?

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Sample with? Or without?

Imagine the following two scenarios.

1. You have a coin with two sides: *Heads* and *Tails*. You're not sure if the coin is fair and so you want to estimate the probability of getting a *Head*.
2. A child reaches into a candy jar with 10 *strawberry*, 50 *chocolate* and 25 *watermelon* candies. The child is able to grab three candies with their hand and you're interested in the probability that all three candies will be chocolate.

(8) Which of these scenarios would you sample *with replacement* and which would you sample *without replacement*? Why?

(9) Write down the line of code you would run to `sample` from the candy jar. Assume the simulated jar is named `candies`.

Simulations at work

(10) Write and run code using the `do` function to perform 10 simulated `samples` of `size` 2, without replacement and *assign* the simulations the name `draws` and then `View` your file. Use `set.seed(1)`.

(11) What are the variable names? What happened in the first simulation? Did any of your 10 simulations contain two rap songs?

Simulations and probability

Counting similar outcomes

(12) Let's break down the code above by running each part of the code one piece at a time. As you run each line of code below describe the output.

- `draws == "rap "`

- `rowSums(draws == "rap ")`

- `mutate(draws, nrap = rowSums(draws == "rap"))`

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Counting other outcomes

Step 1: Creating a subset

(13) Fill in the blanks below to:

1. Create a subset of our simulations when both draws were `"rap"` songs.
2. Count the number of rows in this subset.
3. And divide by the total number of repeated simulations.

```
draws_sub <- filter(draws, _____ = "rap", _____ == "rap")

nrow(_____) / _____
```

Estimating probabilities

(14) Write and run code performing 500 simulations of sampling 2 songs from a playlist of 30 `"rap"`, 23 `"country"` and 47 `"rock"` songs. You might consider running `set.seed` so that your results can be reproduced:

(15) Calculate and write down the estimated probabilities for the following situations:

- You draw two `"rap"` songs.

- You draw a `"rap"` song in the first draw and a `"country"` song in the 2nd.

(16) Create a `histogram` that displays the number of times a `"rap"` song occurred in each simulation. How often were zero rap songs drawn? A single rap song? Two rap songs?

On your own

(17) *If we draw 5 songs from a playlist of 30 rap, 23 country and 47 rock songs, how does the estimated probability of all 5 songs being rap songs change if we draw the songs with or without replacement?*

(18) Describe how the distribution of the number of *rap* songs changes depending on if we use replacement or not.