

## STAT 110: Practice Problem 1 Solutions

Fall 2017

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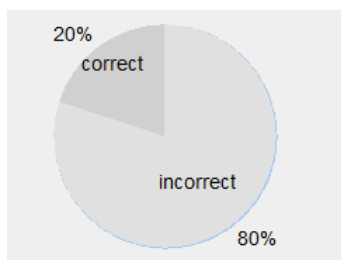
Researchers often use alternative-forced-choice procedures to assist in the evaluation of subjects they suspect are exaggerating their health issues. In one such case, a patient claimed to suffer from memory loss so severe that they couldn't remember what had happened only seconds earlier. To investigate this claim, researchers presented the subject with one of five objects: a black pen, a green highlighter, a yellow pencil, a red crayon, or an orange marker. After presentation of the object, the subject was asked to recall which of these five objects had been displayed (note: they weren't allowed to say, "I don't know" – they were forced to answer with one of the five options). This process was repeated a total of 30 times.

1. To what should you set the **Repeat** value on the spinner for this scenario? Explain your reasoning.

**Repeat = 30 in order to simulate the number of trials in the experiment.**

2. Sketch the spinner that you will use for your simulation below. Be sure to show both the outcomes that are possible on each trial and their associated probabilities.

**If the subject is guessing from one of five objects, the probability of a correct guess is  $1/5 = .20 = 20\%$ .**



3. What is the *expected* number of correct answers a subject would give if guessing on each of the 30 times they are presented with an object?

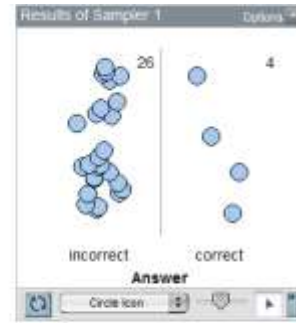
**20% of 30 times = 6 times are expected to result in a correct guess.**

4. Using the examples from class to guide you, carry out a simulation study to determine what outcomes are likely (or unlikely) to occur if the subject is really guessing. In the end, you should have a graph showing the results of **1,000 trials** simulated under the assumption that the subject is guessing.

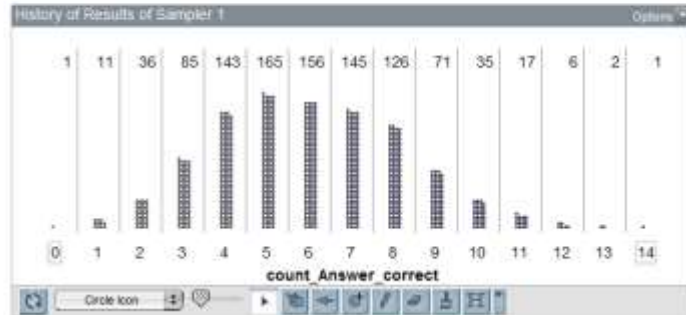
**Your results should be similar to the following. The plot in the lower right-hand corner is the plot of interest.**



Answer	<new>
25	incorrect
25	incorrect
27	incorrect
28	incorrect
29	correct
30	incorrect



count_A	<new>
392	7
393	6
394	0
395	6
396	6
397	5
398	8



5. What does each dot on this plot represent? Be very specific!  
**For each of our 1,000 simulated runs of this experiment, we have a dot representing the number of times the subject was correct out of the 30 times the subject was asked to recall which object had been displayed, assuming the subject was guessing.**
6. Suppose that in the actual study, the subject was correct on 4 of the 30 trials. Based on this observed result, do you believe that the subject is really guessing (which they would have to do if they suffered from severe memory loss), or are you more convinced the subject may be exaggerating their problem? Explain your reasoning, and use the above dotplot in your explanation.  
**A result such as 4 or fewer correct answers out of 30 happens quite often by chance even when the subject is guessing, as is shown in the simulation study. So, an outcome of 4 correct out of 30 is consistent with that of a guessing subject.**
7. Now, suppose that in the actual study, the subject was correct on only 1 of the 30 trials. Based on this observed result, do you believe that the subject is really guessing (which they would have to do if they suffered from severe memory loss), or are you more convinced the subject may be exaggerating their problem? Explain your reasoning, and use the above dotplot in your explanation.  
**An outcome such as 1 correct answer out of 30 is well below what we would expect from a guessing subject, and as is shown in the simulation study, an outcome such as 1 or fewer correct answers out of 30 rarely happens when the subject is guessing. So, I would believe that the subject is exaggerating their problem and is intentionally giving incorrect answers.**