

Name _____
Mr. Schlansky

Date _____
Algebra II

Sample Distributions

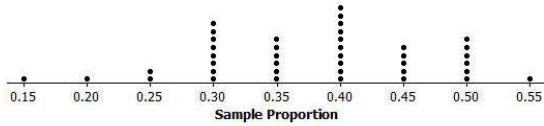
1. In 2013, approximately 1.6 million students took the Critical Reading portion of the SAT exam. The mean score, the modal score, and the standard deviation were calculated to be 496, 430, and 115, respectively. Which interval reflects 95% of the Critical Reading scores?

- 1) 430 ± 115
- 2) 430 ± 230
- 3) 496 ± 115
- 4) 496 ± 230

2. Elizabeth waited for 6 minutes at the drive thru at her favorite fast-food restaurant the last time she visited. She was upset about having to wait that long and notified the manager. The manager assured her that her experience was very unusual and that it would not happen again. A study of customers commissioned by this restaurant found an approximately normal distribution of results. The mean wait time was 226 seconds and the standard deviation was 38 seconds. Given these data, and using a 95% level of confidence, was Elizabeth's wait time unusual? Justify your answer.

3. Jessica got 20 math problems for homework and complained to her teacher that this was an unusual amount of homework. Her teacher told her to look at the number of questions in all of her past homework assignments from the school year and find the range of the expected number of math problems. She found that the mean was 11.2 and the standard deviation was 3. Was Jessica correct that 20 math problems was unusual? Justify your answer.

4. A student wanted to decide whether or not a particular coin was fair. She flipped the coin 20 times, calculated the proportion of heads, and repeated this process a total of 40 times. Below is the sampling distribution of sample proportions of heads. The mean and standard deviation of the sampling distribution are 0.379 and 0.091, respectively. Do you think this was a fair coin? Why or why not?

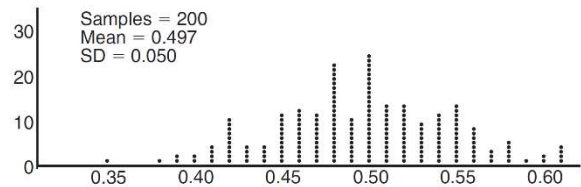


5. Hasan flipped a coin 100 times and got a proportion of .38 heads. He believed this coin was unfair so he repeated the process 200 times and created a sample distribution. The mean of his data was .41 and the standard deviation was .03. Is Hasan correct that the coin is unfair? Explain your answer.

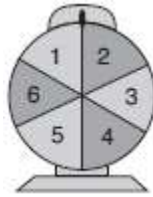
6. Anne has a coin. She does not know if it is a fair coin. She flipped the coin 100 times and obtained 73 heads and 27 tails. She ran a computer simulation of 200 samples of 100 fair coin flips. The output of the proportion of heads is shown below.

Given the results of her coin flips and of her computer simulation, which statement is most accurate?

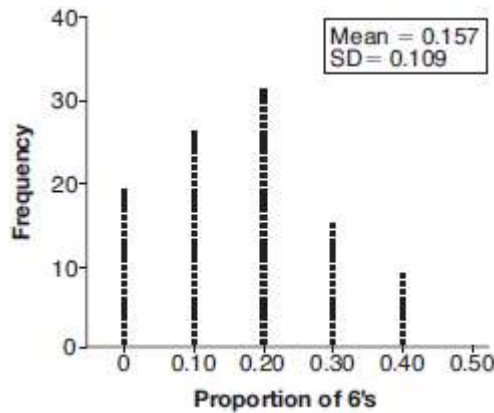
- 1) 73 of the computer's next 100 coin flips will be heads.
- 2) 50 of her next 100 coin flips will be heads.
- 3) Her coin is not fair.
- 4) Her coin is fair.



7. A game spinner is divided into 6 equally sized regions, as shown in the diagram below.



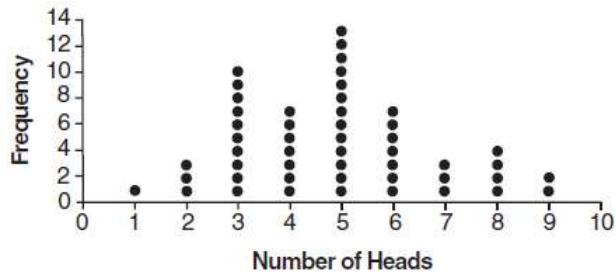
For Miles to win, the spinner must land on the number 6. After spinning the spinner 10 times, and losing all 10 times, Miles complained that the spinner is unfair. At home, his dad ran 100 simulations of spinning the spinner 10 times, assuming the probability of winning each spin is $\frac{1}{6}$. The output of the simulation is shown in the diagram below.



Which explanation is appropriate for Miles and his dad to make?

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| <p>1) The spinner was likely unfair, since the number 6 failed to occur in about 20% of the simulations.</p> <p>2) The spinner was likely unfair, since the spinner should have landed on the number 6 by the sixth spin.</p> | <p>3) The spinner was likely not unfair, since the number 6 failed to occur in about 20% of the simulations.</p> <p>4) The spinner was likely not unfair, since in the output the player wins once or twice in the majority of the simulations.</p> |
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8. The results of simulating tossing a coin 10 times, recording the number of heads, and repeating this 50 times are shown in the graph below.



Based on the results of the simulation, which statement is *false*?

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| 1) Five heads occurred most often, which is consistent with the theoretical probability of obtaining a heads. | 3) Obtaining three heads or fewer occurred 28% of the time. |
| 2) Eight heads is unusual, as it falls outside the middle 95% of the data. | 4) Seven heads is not unusual, as it falls within the middle 95% of the data. |

9. A public opinion poll was conducted on behalf of Mayor Ortega's reelection campaign shortly before the election. 264 out of 550 likely voters said they would vote for Mayor Ortega; the rest said they would vote for his opponent. Which statement is *least* appropriate to make, according to the results of the poll?

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| 1) There is a 48% chance that Mayor Ortega will win the election. | 3) It is most likely that between 44% and 52% of voters will vote for Mayor Ortega. |
| 2) The point estimate (\hat{p}) of voters who will vote for Mayor Ortega is 48%. | 4) Due to the margin of error, an inference cannot be made regarding whether Mayor Ortega or his opponent is most likely to win the election. |

10. Suppose two sets of test scores have the same mean, but different standard deviations, σ_1 and σ_2 , with $\sigma_2 > \sigma_1$. Which statement best describes the variability of these data sets?

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| 1) Data set one has the greater variability. | 3) The variability will be the same for each data set. |
| 2) Data set two has the greater variability. | 4) No conclusion can be made regarding the variability of either set. |