Name Schlansky
Mr. Schlansky

Date _____
Algebra II

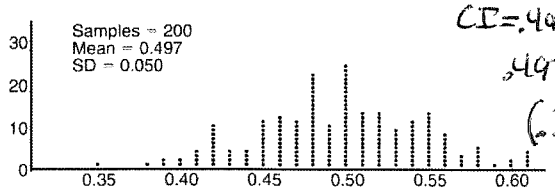
Confidence Interval (Fair)

1. 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.

$\frac{73}{100} = .73$

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

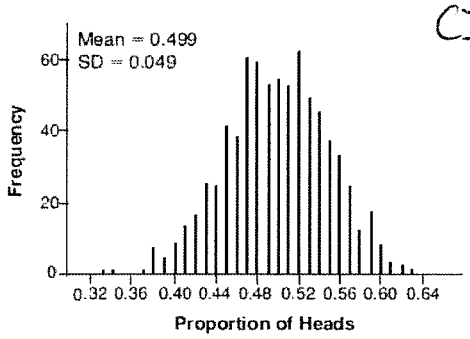
1) 73 of the computer's next 100 coin flips will be heads.
2) 50 of her next 100 coin flips will be heads.
3) Her coin is not fair.
4) Her coin is fair.



CI = .497 ± 2(.050)
.497 − 2(.050)
(.397, .597)

Unfair, .73 is not an expected value of a fair coin.

2. Robin flips a coin 100 times. It lands heads up 43 times, and she wonders if the coin is unfair. She runs a computer simulation of 750 samples of 100 fair coin flips. The output of the proportion of heads is shown below. Do the results of the simulation provide strong evidence that Robin's coin is unfair? Explain your answer.



CI = .499 + 2(.049) = .597
.499 − 2(.049) = .401
(.401, .597)

$\frac{43}{100} = .43$

No, the coin is fair because .43 is an expected value of a fair coin.

3. Juanita rolls a 6 sided die and recorded that it landed on 6 five times out of 50. She questioned whether the die was fair so she ran a computer simulation of 1000 samples of 50 rolls of a fair die. The mean of the simulation was .159 with a standard deviation of .102. Is her die fair? Explain your answer.

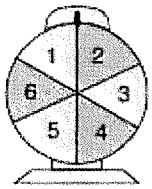
$\frac{6}{50} = .12$

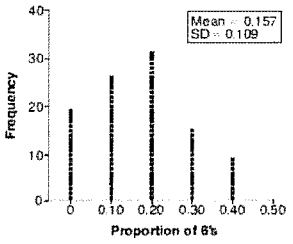
CI = .159 + 2(.102) = .363
.159 − 2(.102) = −.045
(−.045, .363)

Yes, .12 is an expected value of a fair die.

4. 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.

$\frac{0}{10} = 0$





CI = .157 + 2(.109) = .375
.157 - 2(.109) = -.061
(-.061, .375)

Is there strong evidence to suggest that the spinner is unfair? Explain your answer.

No, the spinner is fair because 0 is an expected value of a fair spinner.

5. A spinner with 8 sectors labeled A, B, C, D, E, F, G, H was spun 100 times. The spinner landed on sector B 20 times out of 100. A computer simulation of 500 samples of 100 spins of a fair 8 sector spinner was run and it was found that the mean proportion of landing on sector B was .126 with a standard deviation of .027. Is the spinner fair? Explain your answer.

$\frac{20}{100} = .2$

CI = .126 + 2(.027) = .18
.126 - 2(.027) = .072

(.072, .18)

No, .2 is not an expected value of a fair 8 sector spinner.

6. Ally flipped a coin 100 times a got a proportion of .41 heads. She believed this coin was unfair so she ran a computer simulation of 200 samples of 100 coin flips of a fair coin. The mean of the simulation was .502 and the standard deviation was .024. Is Ally's coin fair? Explain your answer.

.41

CI = .502 + 2(.024) = .55
.502 - 2(.024) = .454

(.454, .55)

Her coin is not fair because .41 is not an expected value of a fair coin.

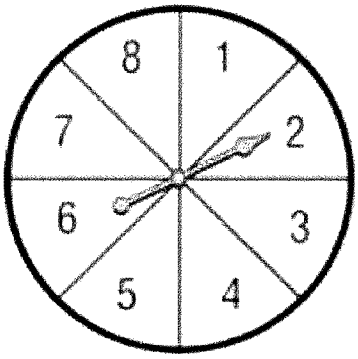
7. A spinner below is spun and it landed on the number "2" 3 times out of 50. A computer simulation of 500 samples of 50 spins of a fair spinner was spun. The mean of the simulation was .128 and the standard deviation was .07. Is the spinner fair? Explain your answer.

$\frac{3}{50} = .06$

$CI = .128 + 2(.07) = .268$

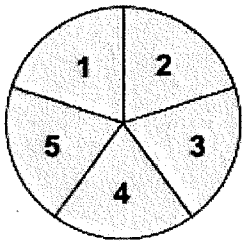
$.128 - 2(.07) = -.012$

$(-.012, .268)$



Yes, .06 is an expected value of a fair 8 sector spinner

8. Joette is playing a carnival game. To win a prize, one has to correctly guess which of five equally sized regions a spinner will land on, as shown in the diagram below.

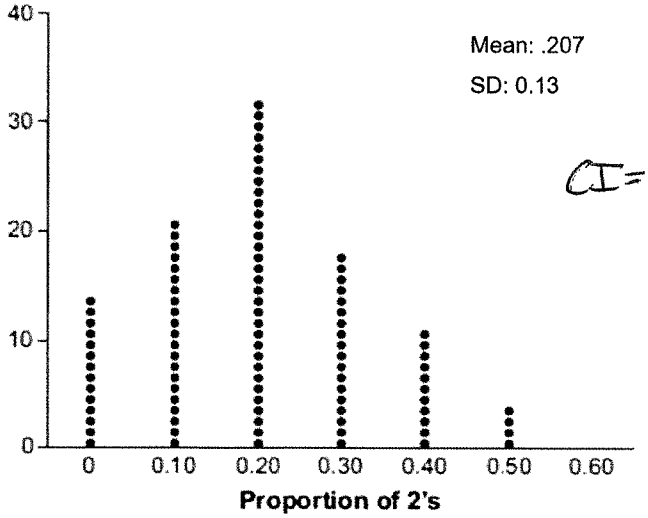


She complains that the game is unfair because her favorite number, 2, has only been spun once in ten times she played the game. State the proportion of 2's that were spun. State the theoretical probability of spinning a 2. The simulation output below shows the results of simulating ten spins of a fair spinner, repeated 100 times.

Theoretical Probability:

$\frac{1}{5} = .2$

$\frac{1}{10} = .1$



$CI = .207 + 2(.13) = .467$

$.207 - 2(.13) = -.053$

$(-.053, .467)$

Does the output indicate that the carnival game was unfair? Explain your answer.

No, it is fair because .1 is an expected value of a fair 5 sector spinner.