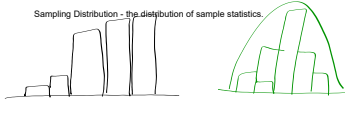


Simulation - When it is too expensive or time consuming to take a large sample. Basic simulations include: flipping a coin or rolling dice. More complicated simulations use a random number generator.

Sampling Distribution - the distribution of sample statistics.



Central Limit Theorem - The sampling distribution of any mean becomes more normal as the sample size, n , grows.

Confidence Interval - Estimated range of values that is likely to include the unknown population parameter.

Margin of Error - Maximum expected difference between a parameter and a statistic.

Confidence Intervals

Estimated range of values that is likely to contain the true population mean.

CI = sample mean \pm margin of error

✓ Margin of Error = $z \left(\frac{s}{\sqrt{n}} \right)$

s - sample standard deviation

n - sample size

✓ 90%, $z = 1.645$

✓ 95%, $z = 1.96$

✓ 99%, $z = 2.58$

Example: 82 ~~hd's~~ had a mean runtime of ~~8.3~~ ^{6.3} minutes with a standard deviation of 5.3 minutes. Determine a 95 % Confidence Interval for the population mean.

$ME = z \left(\frac{s}{\sqrt{n}} \right) = 1.96 \left(\frac{5.3}{\sqrt{82}} \right) = 1.1$

95% CI = $\bar{x} \pm 1.1$

I am 95% confident that the population mean is between

$6.9 - 6.4$

Simulations

A quiz with 10 T/F questions was taken by a friend who claims that she got 8 right by blindly guessing.

Run a simulation to decide if she is being truthful.

Event: Answering a question

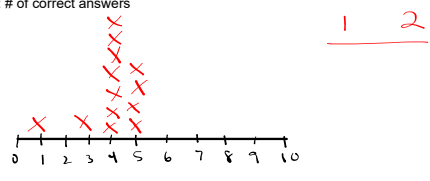
Model: Flip a coin or use random number generator

Response variable: # of correct answers

10 times

1 - T

2 - F



Another Simulation:

A cereal box has 1 of 3 famous baseball cards inside. According to the manufacturer, 20% has player x, 30% has player y, and 50% has player z.

You want all 3 players. How many boxes of cereal will you expect to buy to get a complete set?

Event: buying cereal and getting a card

Model: random number generator from 1 to 10

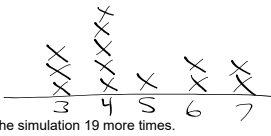
Response variable: number of boxes needed to get all 3 cards.

Simulation:

1,2 means player-x

3,4,5 means player-y

6,7,8,9,10 means player-z



How many boxes of cereal to get all 3? Run the simulation 19 more times.

x	y	z
✓	✓	✓

Blank space for notes or additional work.