

Lesson 32: What does the Fundamental Theorem of Statistics say?

Let's

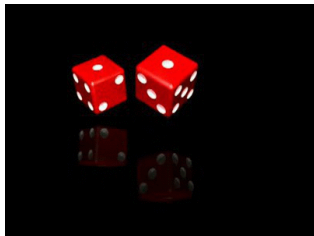
roll

dice

to

find

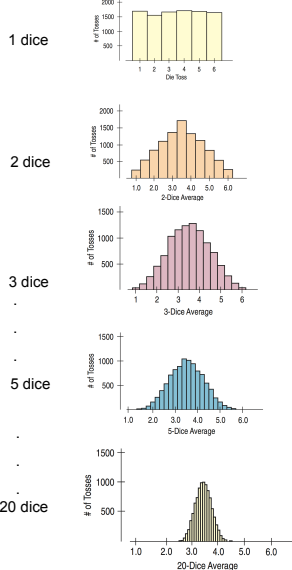
out



For quantitative variables, we can simulate the sampling distribution of a mean

Dice Toss Simulation

Toss + What do you expect?



Notes: 1. As sample size (#dice) gets larger, each sample average is more likely to be closer to the population mean 3.5

2. Shape is approaching normal model

What we see with dice is true for means of repeated samples for almost every situation.

CLT (Central Limit Theorem): The sampling distribution of any mean becomes more nearly normal as the sample size grows. All we need is for the observations to be independent and collected with randomization. And this is regardless of the shape of population distribution.



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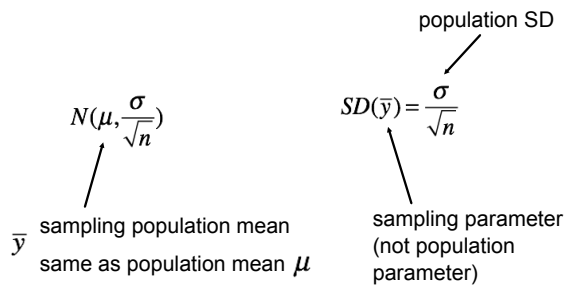
CLT requires the same conditions as for modeling proportions

- (Independence of samples values
- (Sufficiently large sample size

But these conditions are hard to check ...so....

1. Randomization
2. 10% condition(when sample is drawn without replacement, the sample size n should be no more than 10% of the population)
3. Large enough sample condition.
 - If population is unimodal and symmetric, then small sample is ok.
 - If population skewed - then large sample size is needed to use normal model

This normal model has the following parameters:



Example Page 425 Think-Practice

The Centers for Disease Control and Prevention reports that the mean weight of adult men in the United States is 190 lb with a standard deviation of 59 lb.12

Question: An elevator in our building has a weight limit of 10 persons or 2500 lb. What’s the probability that if 10 men get on the elevator, they will overload its weight limit?

