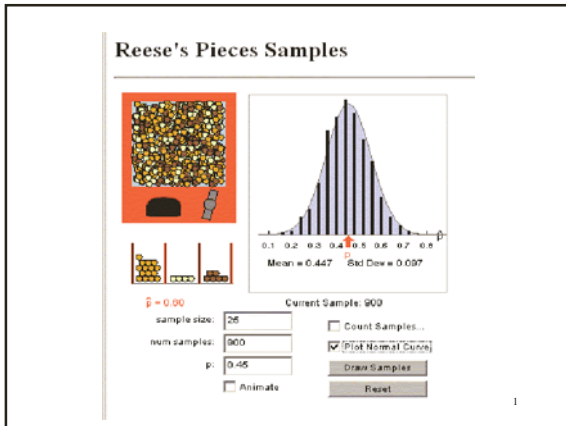


# Stat 101L: Lecture 25




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**Sampling Distribution of  $\hat{p}$**

- \*Shape: Approximately Normal
- \*Center: The mean is  $p$ .
- \*Spread: The standard deviation is  $\sqrt{\frac{p(1-p)}{n}}$

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**Reese's Pieces**

- \*Sampling distribution of  $\hat{p}$ 
  - Shape: Approximately Normal.
  - Center: The mean is 0.45
  - Spread: The standard deviation is  $\sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.45(0.55)}{25}} = 0.0995$

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# Stat 101L: Lecture 25

## Conditions

- \* The sampled values must be independent of each other.
- \* The sample size,  $n$ , must be large enough.

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## Conditions

- \* 10% Condition
  - When sampling without replacement, the sample size should be less than 10% of the population size.
  - Reese's Pieces – the number of pieces in the machine is much greater than 250.

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## Conditions

- \* Success/Failure Condition
  - The sample size must be large enough so that  $np$  and  $n(1-p)$  are both bigger than 10.
  - Reeses Pieces –  $np = 11.25$  and  $n(1-p) = 13.75$  which are both greater than 10.

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# Stat 101L: Lecture 25

## Comment

- \* To be able to use these results you need to know what the value of the population parameter,  $p$ , is.
- \* This is no problem in the Reese's Pieces simulation because we can choose the proportion of Orange pieces.

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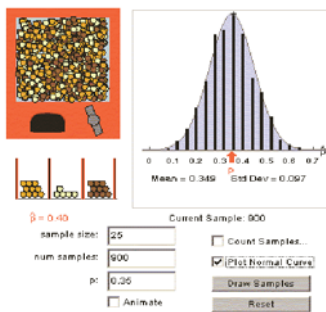
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## Reese's Pieces Samples



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## Inference

- \* For most populations we don't know  $p$ , the population proportion.
- \* We can use the sampling distribution of  $\hat{p}$  to help us make inferences about the reasonable or plausible value of  $p$ .

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