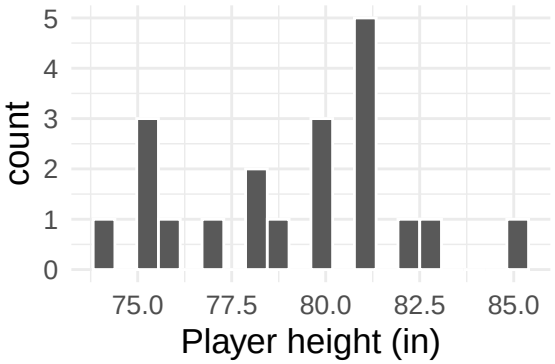
Central Limit Theorem

Sample means

Height example

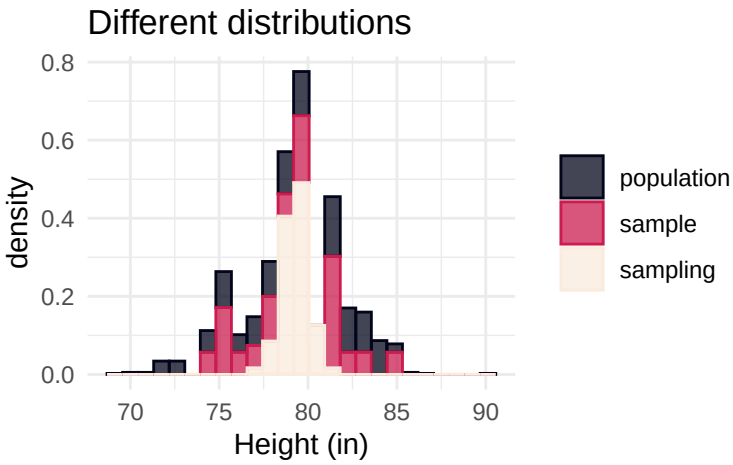
The average height of all NBA players in the 2008-9 season is 79.21 inches, with a population standard deviation of 3.57 inches. We randomly sampled 20 of these players and recorded their heights, as shown.



What is the sampling distribution of the sample mean heights?

Check conditions

Proceed if conditions met



Bank example

Customers are standing in line at a bank.

- Let X_i represent the service time for customer i.
- Suppose that the average service time for all customers is 5 minutes, with a standard deviation of 6 minutes.
- Assume that a bank currently has 36 customers in it, and all customers are independent of each other.
- ***What is the probability that the average service time of all these customers is less than 4 minutes?***

Check conditions

Proceed if conditions met

Sample proportions

M&Ms

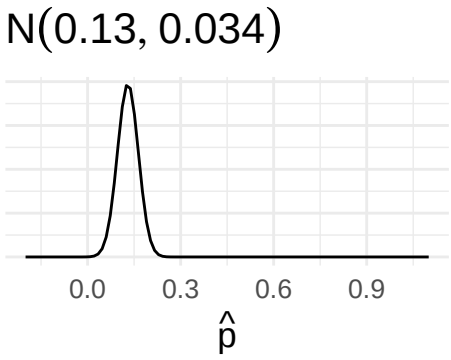
Mars, Inc. is the company that makes M&M's. In 2008, Mars changed their color distribution to have 13% red candies.

Let $\hat{p}$ represent the proportion of red M&M's in a random sample of n M&M's.

What is the sampling distribution of $\hat{p}$ if we take a random sample of size:

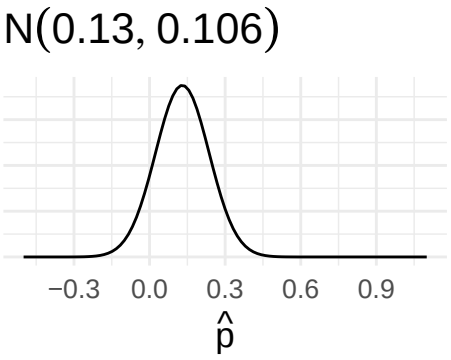
$\underline{\mathbf{n = 100}}$
Check conditions

Proceed if conditions met



$\underline{\mathbf{n = 10}}$
Check conditions

Proceed if conditions met



CLT-based CI for single proportion

$$\text{point est.} \pm \text{critical value} \times \text{SE}$$

Poll example

A poll of 100 randomly sampled registered voters in a town was conducted, asking voters if they support legalized marijuana. It was found that 60% of respondents were in support.

Find a 90% confidence interval for the true proportion of town residents in favor of legalized marijuana.

Check conditions

If conditions met, construct CI

Interpret the confidence interval in context!