Section 7.1 — Introduction to the Central Limit Theorem

Chris Godbout

Sampling Distributions

Central Limit Theorem (CLT)

Sampling Distributions

Definition (Sampling Distribution)

The sampling distribution of a statistic is the distribution of all values of the statistic when all possible samples of the same size *n* are taken from the population.

Definition (Sampling Distribution)

The sampling distribution of a statistic is the distribution of all values of the statistic when all possible samples of the same size n are taken from the population.

Definition (Sampling Distribution of Sample Means)

The sampling distribution of sample means is the distribution of all values of the sample mean (or the distribution of $\bar{x}$) when all possible samples of the same size n are taken from the population.

Example

Assume there are three children with ages 3,4 and 6

Central Limit Theorem (CLT)

For any population with mean μ and standard deviation σ, the sampling distribution of sample means will have the following characteristics if either the sample size n is at least 30 or the population is normally distributed (or both)

Central Limit Theorem

For any population with mean μ and standard deviation σ, the sampling distribution of sample means will have the following characteristics if either the sample size n is at least 30 or the population is normally distributed (or both)

- The sampling distribution can be approximated by a normal distribution.

Central Limit Theorem

For any population with mean μ and standard deviation σ, the sampling distribution of sample means will have the following characteristics if either the sample size *n* is at least 30 or the population is normally distributed (or both)

- The sampling distribution can be approximated by a normal distribution.
- $\mu_{\bar{x}} = \mu$

Central Limit Theorem

For any population with mean μ and standard deviation σ, the sampling distribution of sample means will have the following characteristics if either the sample size *n* is at least 30 or the population is normally distributed (or both)

- The sampling distribution can be approximated by a normal distribution.
- $\mu_{\bar{x}} = \mu$
- $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

4

According to a report in the *Portland Press Herald*, the mean price of heating oil in Maine in December 2010 was \$2.98 per gallon. If 100 samples of 37 heating oil prices were collected from around Maine during that time, what would you expect to be the mean of the sampling distribution of the sample means?