The Central Limit Theorem STAT-UB.0103 – Statistics for Business Control and Regression Models

The Central Limit Theorem

- 1. Consider the population of all Fortune 500 CEOs and their salaries. Suppose that the mean salary (in millions of dollars) is $\mu = 20$, and the standard deviation of the salaries is $\sigma = 5$. You sample 50 CEOs and find their salaries.
 - (a) Draw a histogram of what you think the population looks like.

(b) Consider the sample mean \bar{X} to be a random variable. What is the expectation of \bar{X} ?

(c) What is the standard deviation of \bar{X} ?

(d) Draw a picture of what you think the PDF of \bar{X} looks like.

- 2. You draw a random sample of size n = 64 from a population with mean $\mu = 50$ and standard deviation $\sigma = 16$. From this, you compute the sample mean, \bar{X} .
 - (a) What are the expectation and standard deviation of \bar{X} ?

(b) Approximately what is the probability that the sample mean is above 54?

(c) Do you need any additional assumptions for part (c) to be true?

- 3. You draw a random sample of size n = 16 from a population with mean $\mu = 100$ and standard deviation $\sigma = 20$. From this, you compute the sample mean, \bar{X} .
 - (a) What are the expectation and standard deviation of \bar{X} ?

(b) Approximately what is the probability that the sample mean is between 95 and 105?

(c) Do you need any additional assumptions for part (c) to be true?