

MAT 223, Discussion Questions 11.04

1. What is a sampling distribution? How does it differ from a regular probability distribution?

the distribution of a sample statistic from repeated samples of the same size.
a regular probability distribution reflects individual observations (sample size 1).

2. What are the properties of the Central Limit Theorem? Watch the video at <http://io9.com/the-central-limit-theorem-explained-with-bunnies-and-d-1442140321>.

as the sample size increases, the distribution (of the mean or other statistics) becomes more normal and narrower

3. What is the standard deviation of a sampling distribution for a sample of size 1000 if the probability distribution of a single item is drawn from a population with a standard deviation of 3.6?

$$\sigma_{\bar{x}} = \frac{3.6}{\sqrt{1000}} = .1138\dots$$

4. The SAT has a total mean of 1498 and a standard deviation of 199. What is the probability, in a high school with 75 students in the graduating class, that the average score for the class will be above 1550?

$$\text{normalcdf}(1550, E99, 1498, \frac{199}{\sqrt{75}}) = .011818\dots$$

1.2%

5. The average height for women in the US is approximately 64 inches with a standard deviation of 3.1 inches. What is the probability that a sample of 12 randomly selected women will have an average shorter than 61 inches?

$$\text{normalcdf}(-E99, 61, 64, \frac{3.1}{\sqrt{12}}) = 4.0068 \times 10^{-4}$$

6. What is the probability that the mean height of a sample of 500 women is less than 61 inches?

$$\text{normalcdf}(-E99, 61, 64, \frac{3.1}{\sqrt{500}}) = 0 \quad (\text{so small, Calc. can find it})$$

7. Suppose that we take a sample of 121 people from a population with a mean of 100 and a standard deviation of 15. What is the probability that the mean from this sample will be between 95 and 105?

$$\text{normalcdf}(95, 105, 100, \frac{15}{\sqrt{121}}) = .99975\dots$$

99.98%