MAT 135, Discussion Questions 4.06

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

it is the distribution of means (or other sample stats) that is obtained from taking repeated samples of the same size
narrower than distribution of one sample (individual measurement)

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 sample size increases, distribution becomes narrower & more normal

3. What is the standard deviation (standard error) 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?

$$\frac{\sigma}{\sqrt{n}} = \frac{s}{\sqrt{n}} = \frac{3.6}{\sqrt{1000}} = .1138$$

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?

$\frac{\sigma}{\sqrt{n}} = \frac{199}{\sqrt{75}} = 22.9785$ normalcdf(1550, E99, 1498, 22.9785) =

.0118

around 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?

$\frac{\sigma}{\sqrt{n}} = \frac{3.1}{\sqrt{12}} = .89489$

normalcdf(-E99, 61, 64, .89489) = 4.00689×10^{-4}

or $\boxed{.0004}$

.04%

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

$\frac{\sigma}{\sqrt{n}} = \frac{3.1}{\sqrt{500}} = .1386$

normalcdf(-E99, 61, 64, .1386) = 0

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?

$\frac{\sigma}{\sqrt{n}} = \frac{15}{\sqrt{121}} = \frac{15}{11}$ normalcdf(95, 105, 100, 15/11) = .99975

8. Use the sampling distribution simulator at http://onlinestatbook.com/stat_sim/sampling_dist/ and print the results from sampling distributions for the mean, standard deviation and the range. What do you notice about the different statistics' distributions?

Answers will vary