Name _____ KEY _____

Instructions: Show all work. Provide complete explanations.

1. What is a sampling distribution?

   a sampling distribution is the distribution of sample means from a particular size sample. The mean of the sampling distribution is the population mean w/ st. dev of $\frac{\sigma}{\sqrt{n}}$.

2. What is the main idea that comes from the Central Limit Theorem?

   The larger the sample size the narrower and more normal the sampling distribution

3. Suppose a large sample of men determines that the mean height of men in the US is 69.3 inches with a standard deviation of 3.1 inches.

   a. What is the standard deviation of a sampling distribution with a sample size of 75.

   $$\frac{3.1}{\sqrt{75}} = .357957$$

   $$\approx .36$$

   b. Suppose a sample of 75 men is taken and the mean of that sample is found to be 70.2 inches. What is the z-score of this sample mean?

   $$\frac{70.2 - 69.3}{\left(\frac{3.1}{\sqrt{75}}\right)} = 2.514$$

c. What is the probability that samples of 75 men would produce a sample with a mean of 70.2 inches or taller? Sketch the distribution below using an appropriate mean and standard deviation. Shade the relevant region.

68.22   68.58   68.94   69.3   69.33   70.02   70.36
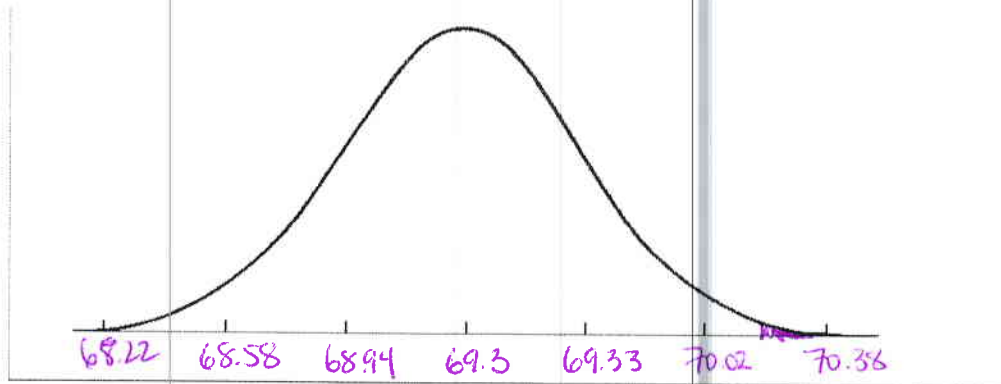
$$\text{normalcdf}\left(70.2,\ E99,\ 69.3,\ \frac{3.1}{\sqrt{75}}\right) = .00596$$

d. Is the sample of 75 that we obtained unusual? Why or why not?

Yes, it is unusual since it's likely to happen less than 5% of the time.