Activity 7:1 Central Limit Theorem

1. A population consists of 250,000 data item each with the same probability of occurring. The mean of the population is $\mu = $ 32 and the standard deviation of $\sigma = 5.5$. Assume that a very large number of samples each with 50 data items. How many possible samples are there? Describe what the sampling distribution would look like.

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2. A population that consists of the values that a random variable can assume is normally distributed and has a standard deviation $\sigma = 18$ and a mean $\mu = 100$. Describe the sampling distribution of all possible samples of size n=125 is taken. Should I have told you what the population size is?

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3. Do you need to know the probabilities of each of the data points before you can answer the above question? Explain your answer.

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4.   A survey is conducted by asking 400 people in the United States the same (Yes/No) question. It is assumed that 35% of the people would answer "Yes" to this question. Describe that sampling distribution.

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5.   How could I have made the standard deviation smaller?

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6.   A population that has a mean of 50 and a standard deviation of 9 is sampled. A sample of size 30 is drawn and the mean of the sample is calculated. What is the probability that the mean of the sample is between 48 and 52?

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7.   Suppose the mean of the sample from the previous example was 41. Would this have caused you to doubt that the sample came from the population described? Explain your answer.

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8.   A school has 2100 students in it.   Their heights are approximately normally distributed with $\mu = 66$ inches and a standard deviation of $\sigma = 2.5$ inches.

   a) What is the probability that a randomly selected student is between 67 inches and 69 inches tall?

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   b) If sixteen students are selected at random, what is the probability that the mean of their heights will be between 67 and 69 inches?

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