Math 106 Fall 2019 **A Few CLT Problems**
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Please type these problems up as usual, on a separate sheet.

1. Each year about 1500 students take the introductory statistics course at a large university. This year scores on the final exam are distributed with a median of 74 points, a mean of 70 points, and a standard deviation of 10 points. There are no students who scored above 100 (the maximum score attainable on the final) but a few students scored below 20 points.
   (a) Is the distribution of scores on this final exam symmetric, right skewed, or left skewed?
   (b) Would you expect most students to have scored above or below 70 points?
   (c) Can we calculate the probability that a randomly chosen student scored above 75 using the normal distribution?
   (d) What is the probability that the average score for a random sample of 40 students is above 75?
   (e) How would cutting the sample size in half affect the standard deviation of the mean?

2. A manufacturer of compact fluorescent light bulbs advertises that the distribution of the lifespans of these light bulbs is nearly normal with a mean of 9,000 hours and a standard deviation of 1,000 hours.
   (a) What is the probability that a randomly chosen light bulb lasts more than 10,500 hours?
   (b) Describe the distribution of the mean lifespan of 15 light bulbs.
   (c) What is the probability that the mean lifespan of 15 randomly chosen light bulbs is more than 10,500 hours?
   (d) Sketch the two distributions (population and sampling) on the same scale. [Obviously this has to be done by hand, not typed. Leave room in your typing for a sketch.]
   (e) Could you estimate the probabilities from parts (a) and (c) if the lifespans of light bulbs had a skewed distribution?

3. Suppose the area that can be painted using a single can of spray paint is slightly variable and follows a nearly normal distribution with a mean of 25 square feet and a standard deviation of 3 square feet.
   (a) What is the probability that the area covered by a can of spray paint is more than 27 square feet?
   (b) Suppose you want to spray paint an area of 540 square feet using 20 cans of spray paint. On average, how many square feet must each can be able to cover to spray paint all 540 square feet?
   (c) What is the probability that you can cover a 540 square feet area using 20 cans of spray paint?
   (d) If the area covered by a can of spray paint had a slightly skewed distribution, could you still calculate the probabilities in parts (a) and (c) using the normal distribution?