MT 143, Quiz #7, Spring 2020 Name _____

Instructions: Show all work. Answers without work can only be graded all or nothing. Partial credit is available only when work is shown. Answer all parts of each problem. Provide explanations as indicated. You may use Minitab or any other statistical software (such as a calculator or Excel) to complete any required statistical calculations or graphs.

1. What sample size is needed for a population with an estimated standard deviation of $s = 7.54$ cm, and the margin of error on a 95% confidence interval is no larger than $E = 2.6$ cm?

$$n = \left(\frac{z^* s}{E}\right)^2 = \left(1.96 \times \frac{7.54}{2.6}\right)^2 = 32.3078\ldots$$

$$n = 33$$

2. Explain the reason we use the Student T-Distribution when the sample size is small and/or the population standard deviation is not known? In your answer, be sure to explain how the T-distribution differs from the normal distribution.

The student T distribution allows for greater variability in the sample by having larger tails than the standard normal distribution. This accounts for both the greater variability of small samples sizes, as well as the variability induced by estimating from an estimate (sample standard deviation instead of the population standard deviation).

3. Given the following properties, calculate the indicated confidence intervals.
   a. $\bar{x} = 54.2, s = 21.3, n = 6, c = 90\%$

$$(36.678, 71.722)$$

   b. $\hat{p} = 0.65, n = 824, c = 99\%$

$$(0.6077, 0.6933)$$