QUIZ 8 - SOLUTION

A horticultural experiment was designed to test the conjecture that the treatment of the soil about peach tree seedlings with an anti-nematode chemical would speed the growth of seedlings by preventing nematode damage. Of the trees, 104 are randomly allocated to the control group and 101 are allocated to the treatment group. At the end of the study period, the heights are recorded for each tree and summarized in the table below:

Group	Sample Mean	Sample Standard Deviation
Control	71.3 cm	4 cm
Treatment	72.2 cm	3 cm

1. (2 points) Find the (estimated) standard error for the difference in sample means.

   The Standard error for the difference in means is $\sqrt{(4^2/104 + 3^2/101)} = 0.49$

2. (2 points) What is the appropriate multiplier for a 88% Confidence Interval?

   1.55

3. (2 points) Find a 88% confidence interval for the increase in height due to the treatment with the anti-nematode chemical.

   $0.9 \pm 1.550.49$ or $(0.14,\ 1.66)$

4. (2 points) Do you think that there is evidence that the treatment leads to increased peach tree height? Explain.

   yes, the confidence interval for the difference in population means does not include 0, so we can be 88% confident that there is a real diferenence in the population means.

5. (4 points) If a 95% confidence interval for the mean height of peach trees treated with the anti-nematode treatment is 71.6 to 73.0 cm, which of the following statements are true or false?

   F If the experiment is repeated many times, 95% of the sample means of the peach trees treated with the anti-nematode chemical would be in the interval 71.6 to 73.0 cm.

   F The probability that the sample mean height is between 71.6 to 73.0 cm for peach trees treated with the anti-nematode chemical is 0.95.

   F 95% of the sample peach trees treated with the anti-nematode will be between 71.6 to 73.0 cm tall.

   F In the population, 95% of the heights of peach trees treated with the anti-nematode chemical will be between 71.6 to 73.0 cm.

Refer back to how the confidence interval was derived using the Empirical Rule. In repeated samples, the confidence interval will contain the population mean 95% of the time. This does not imply that the probability that a particular interval (calculated once we observe the data) contains the population mean is 0.95. Once we obseve the data, nothing is random, so the probability is either 0 or 1 that the population mean is in the inerval. For a simple analogy, before you throw a die, the probability that it lands with a 6 facing up is 1/6. After you throw it and observe a 1, the probability that you observe a 6 is no longer 1/6, but 0. If you observed a 6, it would be 1.