QUIZ 9 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, 50 are randomly allocated to the control group and 50 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. (1 points) Based on the conjecture, what is the alternative hypothesis?

   The anti-nematode treatment **speeds** growth compared to the non-treated seedlings.

2. (5 points) Calculate an appropriate test statistic and find the p-value. Would you accept the alternative hypothesis? Explain.

   The difference is means is 0.9.

   The standard error of the difference is $\sqrt{(4^2/50 + 3^2/50)} = 0.7071$

   The standardize score is $0.9/0.7071 = 1.27$, which is the 90th percentile.

   Because the alternative is that the difference is positive, the p-value is 0.10.

   Using $\alpha = 0.05$ we would not accept the alternative hypothesis because the p-value is greater than 0.05.

3. (1 point each) Which of the following statements are true or false?

   F If the p-value for the two-sided alternative is 0.005, then the p-value for either one-sided alternative is one half of that, so 0.0025. (only for one of the directional hypotheses, not both)

   F One minus the p-value is the probability that alternative hypothesis is true given the observed value of the test statistic.

   F The p-value is the probability that the null hypothesis is true given the observed value of the test statistic.

   F A result that is statistically significant using an α value of 0.05 is always significant at the 1% level.

   T A hypothesis test gives a p-value of 0.09. From this we can accept the alternative hypothesis using an α level of 0.10.

   Check the definition of p-value in the text.