

BIOMETRY, CLASS EXERCISE 13

- (1) In 2017, in a sample of 245 randomly selected apple trees in Saint-Joseph-du-Lac, it was found that 138 had been infected with fire blight. Compute a 98% confidence interval for the percentage of apple trees infected with fire blight in the apple orchards of Saint-Joseph-du-Lac in 2017. Could you make a claim that more than half the apple trees are infected based on this sample?
- (2) Amelia's parents claim that it takes them on average 40 minutes to put a meal on the table for dinner and therefore Amelia should wash the dishes and clean the kitchen after dinner, which according to the parents takes less than 30 minutes. Amelia collected data for 81 days which shows mean dinner preparation time of 37 minutes with standard deviation of 8 minutes and mean clean-up time of 28.5 minutes with standard deviation of 10 minutes.
 - a) For the dinner preparation time test $H_0 : \mu = 40$ against $H_1 : \mu < 40$ at 5% level of significance. Are the parents correct in their claim it takes 40 minutes to prepare dinner?
 - b) For the clean-up time test $H_0 : \mu = 30$ against $H_1 : \mu < 30$ at 5% level of significance. Are the parents correct in their claim it takes less than 30 minutes to clean up after dinner?
- (3) A small brewery monitors the alcohol content of its beer by taking 6 samples from every vat brewed. The label states that the alcohol content is 5% and to avoid hefty fines the brewery discards all vats where a statistically significant deviation from 5% is found. The following are the percent alcohol content data for the sample taken from the last vat:

5.3 5.0 5.1 5.4 5.3 5.3

- a) Calculate the mean and the standard deviation for the alcohol content of the sample.
 - b) Test the null hypothesis $H_0 : \mu = 5$ against $H_1 : \mu > 5$ at a 1% level of significance. Report a p -value. Draw a conclusion in the context of the problem.
- (4) The table below shows the scores obtained by 9 students in a Statistics class on Test 1 and on Test 2.

Test 1	88	68	77	82	63	80	78	71	74
Test 2	73	77	67	74	74	64	71	71	72

Test the null hypothesis $H_0 : \mu_D = 0$ versus the alternative $H_1 : \mu_D > 0$ at 5% level of significance. Here, $\mu_D = \mu_1 - \mu_2$. Report a p -value. Draw a conclusion in the context of the problem.