Math 11 Discussion 8

Wisconsin smokers In 2014, a study conducted by the Wisconsin Division of Public Health revealed that the average Wisconsin teenager who smoked went through 3.1 packs per week. In order to combat teen smoking rates, the state of Wisconsin increased the tax on a pack of cigarettes by $1.00, bringing the average cost of a pack up to $7.67. One year later, the agency randomly sampled 20 teenagers who smoke and found the average number of packs per week smoked was 2.89 with a standard deviation of 0.52.

(a) Is there statistical evidence that the program was effective ($\alpha = 0.05$)?

(b) What is the Type I Error in this case? What is the Type II Error?

Battery stats Apple claims that the battery life of the iPhone X is approximately 21 hours under normal use. A journalist from TechRadar randomly selected 25 phones from the production line and tested these batteries. The tested phones had a mean life span of 18.9 hours with a standard deviation of 3.5 hours.

(a) Construct a 95% confidence interval for the true battery life of the iPhone X.

(b) Do we have enough evidence to suggest that the claim of an average lifetime of 21 hours is false?

(c) If the journalist wants a margin of error of 2%, how many phone batteries should they test?

Coffee supplier Congratulations! You've just achieved your lifelong dream of owning your own coffee shop. The previous owner told you that you would save money if you bought the coffee in a bulk bag of 14 pounds. Each time you purchase a bag of coffee from the distributor, you weigh it to ensure that you are receiving 224 ounces of coffee beans. The results of 7 random measurements are 218, 214, 227, 211, 221, 215 and 220 ounces.

(a) Are these differences due to chance, or is it more likely that the distributor lied about the size of the bags?

(b) For what significance values do you reject the hypothesis that $\mu = 224$?