Tutorial 10

March 28, 2018

Mostly a Q&A session today.

Question 8.S.62, Page 357

An article reports the following values for soil heat flux of eight plots covered with coal dust.

34.7	35.4	34.7	37.7	32.5	28.0	18.4	24.9

The mean soil heat flux for plots covered only with grass is 29.0. Assuming that the heat-flux distribution is approximately normal, does the data suggest that the coal dust is effective in increasing the mean heat flux over that for grass? Test the appropriate hypotheses using $\alpha = 0.05$.

Question 8.S.68, Page 358

In an investigation of the toxin produced by a certain poisonous snake, a researcher prepared 26 different vials, each containing 1 g of the toxin, and then determined the amount of antitoxin needed to neutralize the toxin. The sample average amount of antitoxin necessary was found to be 1.89 mg, and the sample standard deviation was 0.42. Previous research had indicated that the true average neutralizing amount was 1.75 mg/g of toxin. Does the new data contradict the value suggested by prior research? Test the relevant hypotheses. Does the validity of your analysis depend on any assumptions about the population distribution of neutralizing amount? Explain.

Question 3: PSL

A poll was conducted in Ontario in 2014 on whether Starbucks should sell the Pumpkin Spice Latte year round. Of the 1400 people who responded, 534 people said yes. This survey was re-conducted in 2016. Of the 1500 people sampled, 623 people said yes. Suppose a researcher is interested in observing whether there is a growth in interest in making PSL available year round.

(a) State the null and alternative hypotheses of interest.

(b) Carry out the hypothesis test using the p-value method at the 5% significance level.

(c) Construct a 99% confidence interval for the difference in proportions of people who want the PSL to be a year round drink.

Question 4: Sugar Content

A study measured the sugar content of RC Cola and PC Cola. The data is summarized below:

Name	n	$\overline{x}$	s
RC Cola	23	13.69	1.6
PC Cola	20	12.64	1.7

(a) Suppose that the two samples have a common population variance, σ^2. Find the pooled estimator of σ^2.

(b) Assuming both samples come from a normal distribution with common population variance, carry out a pooled hypothesis test at the 1% level of significance to test whether RC Cola has a higher sugar content than PC Cola.

(c) Construct a 99% lower bound for the difference in sugar content between RC Cola and PC Cola.