Discussion - Week 9

Example 1
A researcher wanted to compare the starting salaries of college graduates majoring in education and social sciences. He collected a random sample of 50 recent college graduates from each major. He found out that the 50 graduates majoring in education on average earn $\$35,554$ with a standard deviation $\$2,225$, while the 50 graduates majoring in social sciences on average earn $\$33,348$ with a standard deviation $\$2,375$.

(a) Is this a case of independent samples, or paired differences? Explain.

(b) Find a 99% confidence interval for the difference in the average starting salaries of college graduates majoring in education and social sciences. Check that the appropriate conditions are satisfied, and interpret the interval.

(c) Does the confidence interval contain 0? What is your conclusion based on the confidence interval?

(d) Conduct a hypothesis test to check if the starting salaries of the two groups of graduates are different on average. Use $\alpha = 0.01$. Check the appropriate conditions. State the hypotheses, the value of the test statistic, the p-value, and your conclusion.

(e) Do the results from the confidence interval and the hypothesis test agree? Explain.

Example 2
A nutritionist wanted to determine if cereal products of brand A on average contain more sugar per serving than cereal products of brand B. She randomly selected 15 cereal products from brand A, and 13 cereal products from brand B. The products from brand A had an average sugar content of 11g with a sample standard deviation of 1.5g. The products from brand B had an average sugar content of 10g with an average standard deviation of 1.7g. Suppose it is known that sugar content among different cereal products of both brands is approximately normally distributed.

(a) Is this a case of independent samples, or paired differences? Explain.

(b) Conduct a hypothesis test to check if brand A products have higher average sugar content per serving than brand B products. Use $\alpha = 0.05$. Check the appropriate conditions. State the hypotheses, the value of the test statistic, the p-value, and your conclusion.

Example 3
A drug manufacturer claims that its new treatment promotes weight loss. A scientist testing that claim recorded the weights of a random sample of 60 patients before and after being subjected to the treatment. He then computed the differences by subtracting the weight before treatment from the weight after treatment. The differences had a sample mean of -3.2 pounds, and a standard deviation of 3.5 pounds.

(a) Is this a case of independent samples, or paired differences? Explain.

(b) Conduct a hypothesis test to check the manufacturer's claim. Use $\alpha = 0.05$. Check the appropriate conditions. State the hypotheses, the value of the test statistic, the p-value, and your conclusion.