Fact Sheet – Two Mean Test (11.3)

This test is used to compare the mean of one population to the mean of another population. The two samples must be independent, meaning that there is no one-to-one relationship between values in the first sample and the second sample.

Example: Students taking a traditional algebra class have higher exam scores than students who take the course online.

Conditions

To test hypotheses regarding two means, the following two conditions must be met.
- Each sample must have no outliers (Boxplot) and be normally distributed (QQ Plot).
  (***If you do not have data, you can assume this is true.***)
  OR
  each sample size is at least 30 $(n_1 \geq 30$ and $n_2 \geq 30)$

- $20n \leq N$

Hypothesis Test

Step 1

You must identify which population is Population 1.

The null hypothesis will be $\mu_1 = \mu_2$. H$_1$ will be either $\mu_1 < \mu_2$, $\mu_1 > \mu_2$, or $\mu_1 \neq \mu_2$.

Step 3

The test statistic is $t = \dfrac{\overline{x}_1 - \overline{x}_2}{\sqrt{\dfrac{s_1^{\,2}}{n_1} + \dfrac{s_2^{\,2}}{n_2}}}$.

Just write "Two Mean Test", rather than writing the test statistic.

Step 4

To compute the test statistic and P-value using StatCrunch …

Summary: Stat > T Statistics > Two sample > Summary
Enter the mean, standard deviation, and size for each sample. Click Next.
Leave the value for null: mean diff. as 0. Select the appropriate sign for H1. Click Calculate.

Data:
Enter the data in two columns.
Stat > T Statistics > Paired
Select the correct column for each sample. Click Next.
Leave the value for null: mean diff. as 0. Select the appropriate sign for H1.
Uncheck the Pool Variances button.
Click Calculate.

Classroom Examples (11.3)

1) A random sample of 88 male deaths in a county over a one-year period had a mean age at death of 68.9 years, with a standard deviation of 16.71 years. A random sample of 84 female deaths in the same county over the same one-year period had a mean age at death of 77.1 years, with a standard deviation of 15.65 years. At the 0.01 level of significance, test the claim that the mean age at death in this county is lower for males than it is for females.

2) A random sample of 56 departing flights at an airport over a three-month period had a mean wait of 14.2 minutes between boarding and takeoff, with a standard deviation of 4.53 minutes. At the same airport, a random sample of 81 incoming flights over the same three-month period had a mean wait of 17.5 minutes between the time that the plane arrived at the gate and the time that the baggage reached the baggage claim area, with a standard deviation of 9.87 minutes. At the 0.05 level of significance, test the claim that at this airport the mean wait for takeoff is less than the mean wait for baggage.

3) A golfer is considering buying a new driver. He hits 12 balls with his old driver, and then 15 balls with the new driver. Here are the distances, in yards.

Old

238	261	263	236	269	251	268	251
270	250	262	242				

New

254	266	275	279	261	268	280	269
285	254	276	272	283	262	267	

At the 0.05 level of significance, test the claim that the mean driving distance with his old driver is less than the mean driving distance the new driver.