## Conditions

Average entry level salaries for college graduates with mechanical engineering degrees and electrical engineering degrees are believed to be approximately the same. (Source: http://www.graduatingengineer.com). A recruiting office thinks that the average mechanical engineering salary is actually lower than the average electrical engineering salary. The recruiting office randomly surveys 50 entry level mechanical engineers and 60 entry level electrical engineers. Their average salaries were $46,100 and $46,700, respectively. Their standard deviations were $3450 and $4210, respectively. Conduct a hypothesis test to determine if you agree that the average entry level mechanical engineering salary is lower than the average entry level electrical engineering salary.

## Solution

For this test, the null hypothesis is that the means of samples are equal:

$$H_0: M_1 = M_2$$

$$H_a: M_1 < M_2$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{X_1X_2}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}},$$

$$S_{X_1X_2} = \sqrt{\frac{1}{2}\left(S_{X_1}^2 + S_{X_2}^2\right)}$$

$$S_{X_1}^2 = \frac{\sum_{i=1}^{6}(X_1 - \bar{X}_1)^2}{n}$$

$$S_{X_2}^2 = \frac{\sum_{i=1}^{6}(X_2 - \bar{X}_2)^2}{n}$$

For this example:

$$t = 0.814122$$

The degrees of freedom:

$$k = 50 + 60 - 2 = 108$$

For these degrees of freedom the t-criteria value is:

1.9840 – for p=0.95

We can make a conclusion, that with probability 95% there is no difference between 2 groups. H0 is approved. The average salaries are equal.