Answer on Question #53703 – Math – Statistics and Probability

A study is done to determine if students in the California state university system take longer to graduate, on average, than students enrolled in private universities. One hundred students from both the California state university system and private universities are surveyed. Suppose that from years of research, it is known that the population standard deviations are 1.5811 years and 1 year, respectively. The following data are collected. The California state university system students took on average 4.5 years with a standard deviation of 0.8. The private university students took on average 4.1 years with a standard deviation of 0.3.

Solution

Test the claim at 5% level of significance.

$H_0: \mu_{CSU} - \mu_{PU} \leq 0$

$H_a: \mu_{CSU} - \mu_{PU} > 0$

Since the population standard deviations are known we can use z-distribution.

Test statistic is

$$z = \frac{\overline{x_{CSU}} - \overline{x_{PU}}}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} = \frac{4.5 - 4.1}{\sqrt{\frac{1.5811^2}{100} + \frac{1^2}{100}}} = 2.14.$$

Critical value for 5% level of significance:

$$z_{crit} = 1.645.$$

We reject the null hypothesis at 5% level of significance because the test statistic $z = 2.14$ is bigger than critical value $z_{crit} = 1.645$. There is evidence to conclude that students in the California state university system take on average longer to graduate, than students enrolled in private universities.