

**Question:**

Two different types of bulbs (A and B) were being tested to test the claim stating that Type B has a longer lifetime (in hours), on average, than that of Type A. A random sample of Type A and a random sample of Type B were tested; the following statistics were obtained from the two samples:

Type	Sample Size	Mean
A	16	175
B	26	200

Assume that the lifespan of the two types are normally distributed with standard deviations of 7 and 9, respectively. Test the claim using  $\alpha=0.05$ .

**Solution:**

$$H_0: \mu_A = \mu_B$$

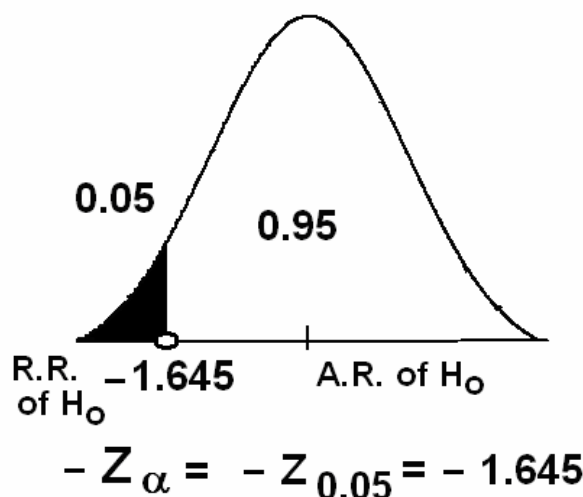
$$H_1: \mu_A < \mu_B$$

$$H_0: \mu_A - \mu_B = 0$$

$$H_1: \mu_A - \mu_B < 0$$

$$\alpha=0.05$$

$$Z = \frac{\bar{X}_A - \bar{X}_B}{\sqrt{\frac{\sigma_A^2}{n_A} + \frac{\sigma_B^2}{n_B}}} = \frac{175 - 200}{\sqrt{\frac{49}{16} + \frac{81}{26}}} = -10.06$$



Since  $Z=-10.06 \in \text{R.R.}$ , we reject  $H_0$  at  $\alpha=0.05$  and accept  $H_1: \mu_A < \mu_B$ . Therefore, we conclude that the Type B has a longer lifetime (in hours), on average, than that of Type A.