

Task

9.77 Serving Time.

According to the Bureau of Crime Statistics and Research of Australia, as reported on Lawlink, the mean length of imprisonment for motor-vehicle-theft offenders in Australia is 16.7 months. One hundred randomly selected motor vehicle-theft offenders in Sydney, Australia, had a mean length of imprisonment of 17.8 months. At the 5% significance level, do the data provide sufficient evidence to conclude that the mean length of imprisonment for motor-vehicle-theft offenders in Sydney differs from the national mean in Australia? Assume that the population standard deviation of the lengths of imprisonment for motor-vehicle-theft offenders in Sydney is 6.0 months.

Answer :

Hypothesis test :

$$H_0 : \mu = 16.7 \text{ and}$$

$$H_1 : \mu \neq 16.7 \text{ (two tails)} \rightarrow \frac{\alpha}{2}$$

$$\sigma = 6.0$$

$$\alpha = 0.05 \rightarrow \frac{\alpha}{2} = 0.025$$

$$n = 100$$

$$\bar{x} = 17.8$$

$$Z_{\text{calculated}} = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}} = \frac{17.8 - 16.7}{6 / \sqrt{100}} = \frac{1.1}{0.6} = 1.83333333$$

$$Z_{\text{table}} = \pm 1.96$$

Since z calculate in outside critical values, so failed to reject H_0

Conclusion

So, there is not enough evidence to conclude that the mean length of imprisonment for motor-vehicle-theft offenders in Sydney differs from the national mean in Australia.

Check with P-value test

$$P\text{values} = 2P(z > 1.83333333) = 2(1 - P(z < 1.833333)) = 2(1 - 0.96662222) = 0.06675$$

$$\alpha = 0.05$$

Since $P\text{values} > \alpha$ it means there is not enough evidence to conclude that the mean length of imprisonment for motor-vehicle-theft offenders in Sydney differs from the national mean in Australia.