

Answer on Question #79669 – Math – Statistics and Probability

Question

A child welfare officer asserts that the mean sleep of young babies is 4 hours a day. A random sample of 64 babies show that their mean sleep was only 13 hours 30 minutes with a standard deviation of 3 hours. at 5 % level of significance, test the assertion that mean sleep of babies is less than 14 hours a day.

Solution

We should correct the information. In the first sentence, we see “young babies is 4 hours a day”. However, firstly, young babies cannot sleep 4 hours a day. The second, we see “their mean sleep was only 13 hours 30 minutes”. Therefore, the first sentence we read in such way: “A child welfare officer asserts that the mean sleep of young babies is 14 hours a day”.

In order to test the assertion that mean sleep of babies is less than 14 hours a day, we use z-test. For this, we test the null hypothesis $H_0: \mu = 14$. Then $H_1: \mu < 14$.

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{13.5 - 14}{\frac{3}{\sqrt{64}}} = -\frac{4}{3} = -1.333$$

If we need 5% level of significance, then $Z_{\alpha} = -1.65$.

The rejection region is $(-\infty, -1.65]$

As we see, $z > Z_{\alpha}$, the test statistic does not fall in the rejection region, so we use $H_0: \mu = 14$.

Answer: the assertion that the mean sleep of babies is less than 14 hours a day is wrong.