A random sample of 205 college students was asked if they believed that places could be haunted and 65 of them responded "yes." Estimate the true proportion of college students who believe in the possibility of haunted places with 99% confidence. According to Time magazine, 37% of Americans believe that places can be haunted.

Solution

A random sample of 205 college students was asked if they believed that places could be haunted, and 65 of them responded yes.

That is $n = 205, x = 65$

$$\hat{p} = \frac{x}{n} = \frac{65}{205} = 0.317$$

We use two-tailed test for testing the Hypothesis according to time magazine, 37% of ameri cans believe that places can be haunted.

Null Hypothesis

$H_0: p = 0.37$

Alternative Hypothesis

$H_1 \coloneqq p \neq 0.37$

we use the test stati stics Z

$$Z = \hat{p} - \frac{p}{\sqrt{\frac{p(1-p)}{n}}} = 0.317 - \frac{037}{\sqrt{\frac{0.37 \times 1 - 0.37}{205}}} = -\frac{0.053}{0.034} = -1.570$$

$$P - value = 2 \times P(z < -1.57) = 2 \times 0.0582 = 0.1164$$

Here P - value is 0.1164 which is more the level of significant $\alpha = 0.01$. By the method of P - value we fail to reject our Hypothesis H_0. At the 1% level of significant the data provide sufficient evidence to conclude that 37% of ameri cans believe that places can be haunted.