

NAME: _____ ^{1st}

STAT 226, Section D—Quiz 11 (4 pts.)

1. **Spending on housing.** The Census Bureau reports that households spend an average of 31% of their total spending on housing. A home-builders association in Cleveland wonders if the national findings applies in their area. They interview a sample of 40 households in the Cleveland metropolitan to learn what percent of spending devoted to housing goes toward housing. Denote by μ to be the mean percent of spending devoted to housing among all Cleveland households and note that the population standard deviation is $\sigma = 9.6\%$.

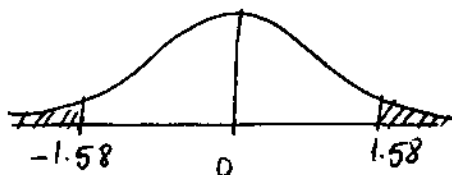
(a) State the null and the alternative hypotheses.

$$H_0: \mu = 31 \qquad H_a: \mu \neq 31$$

(b) The study finds that the sample mean for 40 households selected at random is 28.6%. What is the value of the test statistics z ?

$$z = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}} = \frac{28.6 - 31}{9.6 / \sqrt{40}} = -1.58$$

(c) Sketch the normal curve and mark z on the axis. Shade the area under the curve that represents the p-value.



(d) Find the p-value. Are you convinced that Cleveland differs from the national average?

$$p\text{-value} = P(z \leq -1.58) + P(z \geq 1.58) = 2 * \overset{0.0571}{\cancel{0.0571}} \\ = 0.1142 \quad (\text{or } 11.42\%)$$

Not very convincing, there is $\approx 11.5\%$ of getting a sample mean as unusual as 28.6% when $\mu = 31\%$. To be convinced we would want to see a much smaller p-value.