One-Proportion hypothesis test

A real estate agency claims that, in Capital Federal, at most 9% of rentals are not renewed after the contract ends. In a sample of 188 rentals whose contract ended, it was found that 166 were not renewed. Using a type I error probability of 7%, determine through a hypothesis test whether the real estate agency's claim can be corroborated by the data.

- Null Hypothesis (H_0): The proportion of rentals that are not renewed is at most 9

$$H_0 : p \leq 0.09$$

- Alternative Hypothesis (H_a): The proportion of rentals that are not renewed is greater than 9

$$H_a : p > 0.09$$

This is an upper-tail (one-sided) test because we are testing whether the proportion is greater than 9

- Sample size: $n = 188$
- Number of non-renewals: $x = 166$
- Sample proportion $\hat{p}$:

$$\hat{p} = \frac{x}{n} = \frac{166}{188} \approx 0.88298$$

We calculate the standard error (SE) under the null hypothesis:

$$\text{SE} = \sqrt{\frac{p_0(1-p_0)}{n}} = \sqrt{\frac{0.09 \times 0.91}{188}} \approx \sqrt{\frac{0.0819}{188}} \approx 0.02087$$

where $p_0 = 0.09$ is the proportion under H_0.
We calculate the z statistic:

$$z = \frac{\hat{p} - p_0}{\text{SE}} = \frac{0.88298 - 0.09}{0.02087} \approx \frac{0.79298}{0.02087} \approx 38.000$$

With a significance level $\alpha = 0.07$ and a one-sided (upper-tail) test, the critical value z_c is:

$$P(Z \leq z_c) = 1 - \alpha = 1 - 0.07 = 0.93$$

Using the standard normal distribution table or an application, we find the z_c value corresponding to a cumulative area of 0.93:

$$z_c \approx 1.475$$

Since $z > z_c$ ($38.000 > 1.475$), we reject the null hypothesis H_0.
With a 7% significance level, there is sufficient evidence to reject the real estate agency's claim. The data indicate that the proportion of rentals that are not renewed is significantly greater than 9%.