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## Chapter: 9 – Headlights / Proportions

Problem Definition: A highway patrol person believes that motorists follow the rules less often than the currently held belief of 30% and wants proof that there is a bigger issue with drivers obeying the law.

Hypothesis:

$$H_0: \pi = .3$$

$$H_1: \pi < .3$$

Decision Rule: If the critical ratio is greater than the critical value -1.65 then the null is rejected.

Test:

### Descriptive Statistics

N	Event	Sample p	95% Upper Bound for p
275	62	0.225455	0.266904

### Test

Null hypothesis  $H_0: p = 0.3$

Alternative hypothesis  $H_1: p < 0.3$

Z-Value	P-Value
-2.70	0.003

Conclusion:

- 1) The critical ratio of -2.7 is less than the critical value -1.65, rejecting the null hypothesis. There is a chance of a type 2 beta error, and a true null has been rejected.
- 2) P-value of 0.003 < 0.05 alpha  $\alpha$  rejecting the null hypothesis.
- 3) The hypothesized value of  $\pi = .3$  falls outside the confidence interval lower bound of 0.267 rejecting the null hypothesis.

Interpretation: The selected sample shows that the highway patrol person was correct with a significant chance that there are less than 30% of motorists following the law. It is recommended that an increase in patrol personnel would be justified, along with added shifts, and routes.

Assumptions: With an independently and randomly selected sample size of 275, I can approximate the binomial with the normal because, [ $np \geq 10$  or  $(265)(0.88)=24.2$ ] and [ $n(1-p) \geq 10$  or  $(275)(1-0.88)=33$ ].