One Proportion

Parameter: p
Point est.: $\hat{p}$

Hypothesis Test

Hypotheses

$H_0: p = p_0$

H_a: ① $p < p_0$
② $p \neq p_0$
③ $p > p_0$

Test Statistic
Random Variable
(Assuming H_0)

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \sim N(0,1)$$

Observed Test Statistic

$$z_{obs} = \frac{\hat{p}_{obs} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

P-value

① $P(\hat{p} \leq \hat{p}_{obs}) = P(Z \leq z_{obs})$

② $2P(\hat{p} \geq \hat{p}_{obs}) = P(|Z| \geq |z_{obs}|)$

③ $P(\hat{p} \geq \hat{p}_{obs}) = P(Z \geq z_{obs})$

Conditions for Distributional Approx.
(Assuming H_0 is true)

1. Independent observations
2. Number of expected successes & expected failures at least 10
   $[np_0 \geq 10 \text{ \& } n(1-p_0) \geq 10]$

Confidence Interval

Formula for CI

$$\hat{p}_{obs} \pm z^* \sqrt{\frac{\hat{p}_{obs}(1-\hat{p}_{obs})}{n}}$$

Conditions for Distributional Approximation

1. Independent observations
2. Number of observed successes and observed failures at least 10
   $[n\hat{p}_{obs} \geq 10 \text{ \& } n(1-\hat{p}_{obs}) \geq 10]$