Theory: $\hat{p} \sim N\left(p, \underbrace{\sqrt{\frac{p(1-p)}{n}}}_{\text{SD}}\right)$

population proportion

$$p \approx \hat{p}, \quad SE = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Application #1: CI

95%

$$\hat{p} - 2\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \le p \le \hat{p} + 2\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Application #2 : HT

$$\underbrace{H_0 : p = p_0}_{\text{null}} \quad \text{vs.} \quad \underbrace{H_a : \left.\begin{matrix} p < p_0 \\ p \neq p_0 \\ p > p_0 \end{matrix}\right\}}_{\text{alternative}} \text{ one of these}$$

Then compute

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

test statistic based on H_0

), get the p-value,

then conclude.

6.52

$n = 616$

p-value = .276

$$\hat{p} = \frac{438}{616} = .711$$

$$\underbrace{H_0 : p = .7}\ \text{vs.}\ H_a : p > .7$$

$$z = \frac{.711 - .7}{\sqrt{\frac{(.7)(.3)}{616}}} = .596$$

.0185

Theory: $\bar{x} \sim N\left(\mu, \frac{\sigma}{\sqrt{n}}\right)$

population mean

σ = pop. SD

SD for $\bar{x}$'s

$\mu \approx \bar{X}, \quad \sigma \approx S$

sample SD

compute test statistic

$$t = \frac{\bar{x} - \mu_0}{\left(\frac{s}{\sqrt{n}}\right)}$$

from H_0

SE

$$df = n - 1$$

6.63

$n = 1{,}000$

$\mu = 28, \ \sigma = 5$

$$\bar{x} \sim N\left(28, \frac{5}{\underbrace{\sqrt{1{,}000}}_{.16}}\right)$$

$$\boxed{\bar{x} \sim N(28, .16)}$$