Theory:

$$\hat{p} \sim N\Big(p, \underbrace{\sqrt{\frac{p(1-p)}{n}}}_{SD}\Big)$$

Pop. proportion

Application #1: CI for p

$$\hat{p} - 2 \times SE \leq p \leq \hat{p} + 2 \times SE$$

$$SE = \sqrt{\hat{p}(1-\hat{p})/n}$$

Application #2: HT

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

compute $z = \dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0(1-p_0)}{n}}}$.

then get p-value

6.52

$H_0: p = .7$ vs. $H_a: p > .7$

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

$p = .28$

$z = \dfrac{\hat{p} - .7}{\sqrt{\dfrac{(.7)(.3)}{616}}} = .5946\ldots$

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

population mean

σ = pop. SD

$\mu \approx \bar{x}$, $\sigma \approx \underbrace{s}_{\text{sample's SD}}$

$$SE = \frac{s}{\sqrt{n}}$$

use the t-distribution with $(n-1)$ degrees of freedom: $t(n-1)$

$$t = \frac{\bar{X} - \mu_0}{s/\sqrt{n}}$$

#63 : $n = 1{,}000$

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

$$\bar{x} \sim N\left(28, \underbrace{\frac{5}{\sqrt{1000}}}_{.16}\right)$$

#86 $C = 99\%$

$\bar{x} = 88.3$

$s = 32.1$

$n = 15$

$\dfrac{32.1}{\sqrt{15}} = 8.3$

$$\boxed{\bar{x} \pm 2.977 \times SE}$$

Then get

$$88.3 \pm 24.84 =$$

$$63.46 \text{ to } 113.14$$

$$63.46 \leq \mu \leq 113.14$$