

Lesson 6 - Strength of Evidence - Theory based Approach

- Lesson objectives:
1. Theory based approach
 2. Validity conditions
 3. Calculate SD
 4. Use R for one proportion z-test.

Theory based approach to statistical inference (one proportion z-test)

- Can approximate the p-value using the normal distribution (and standardized statistic)
- ↳ no need to simulate

When can we use theory based approach?

- Validity Conditions must be met

- ≥ 10 successes
 - ≥ 10 failures
- } Both

Can predict distribution is normal.

- mean of dist
- SD of dist

Use of theory based approach:

if n is large enough (aka validity conditions met)

Distribution \rightarrow normal distribution

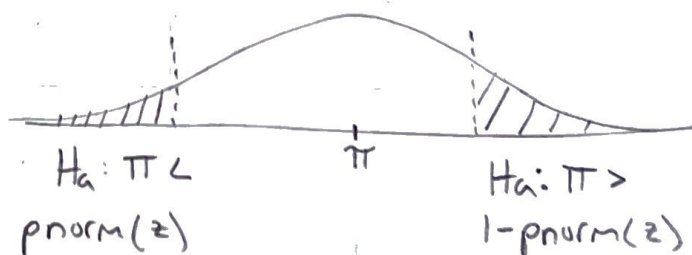
mean $\rightarrow \pi$

$$SD(\text{null}) \rightarrow \sqrt{\frac{\pi(1-\pi)}{n}}$$

Calculation of z (no change)

$$z = \frac{\hat{p} - \pi}{SD(\text{null})}$$

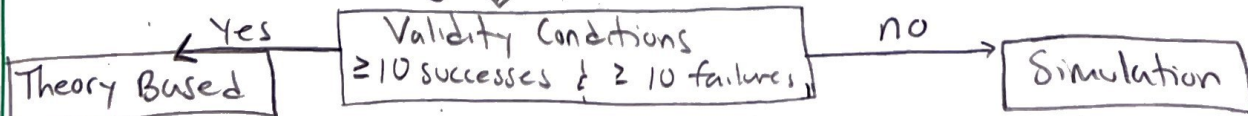
Calculation of p-value



$H_a: \pi \neq$

$$2 * (1 - pnorm(abs(z)))$$

One Proportion
Strength of evidence



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

p-value:

$H_a: \pi > 1 - pnorm(z)$; $H_a: \pi < pnorm(z)$

$$z = \frac{\hat{p} - \pi}{SD(\text{null})}$$

$$p\text{-value} = \frac{\text{sum}(\text{dots} \geq \hat{p})}{n}$$