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

Can predict distribution is -normal.
- mean of dist
- SD of dist

When can we use theory based approach?
- **Validity Conditions** must be met
  - ≥ 10 successes } Both
  - ≥ 10 failures }

Use of theory based approach:
if n is large enough (aka validity conditions met)

Distribution → normal distribution

mean → π

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

Calculation of z (no change)

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

Calculation of p-value

pnorm(z) | 1-pnorm(z)

$H_a: \pi \neq$

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

One Proportion
Strength of evidence

Validity Conditions
≥10 successes & ≥ 10 failures

Yes → Theory Based

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

p-value:
$H_a: \pi >$ 1-pnorm(z)
$H_a: \pi <$ pnorm(z)
$H_a: \pi \neq$ 2*(1-norm(abs(z)))

no → Simulation

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

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