

Homework Solutions
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Exercise 35

- (a) Let p_1 be the survival rate with carbolic acid and let p_2 be the survival rate without carbolic acid. The hypotheses are

$$H_0 : p_1 = p_2$$

$$H_1 : p_1 > p_2$$

- (b) For patients with carbolic acid we have $\hat{p}_1 = \frac{34}{40} = 0.85$ and for patients without carbolic acid we have $\hat{p}_2 = \frac{19}{35} = 0.5429$.
- (c) Step 1 was done in part (a), so we will show steps 2 through 7.

2. $\alpha = 0.05$.

3. Let $z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1 - \hat{p}) \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$, where $\hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$.

4. Compute \hat{p} first. We get

$$\hat{p} = \frac{34 + 19}{40 + 35} = \frac{53}{75} = 0.7067.$$

Then compute z :

$$\begin{aligned} z &= \frac{0.85 - 0.5429}{\sqrt{(0.7067)(0.2933) \left(\frac{1}{40} + \frac{1}{35} \right)}} \\ &= \frac{0.3071}{0.1045} \\ &= 2.914. \end{aligned}$$

5. The p -value is `normalcdf(2.914, E99) = 0.00178`.
6. Reject H_0 .
7. The survival rate is higher when carbolic acid was used.

You can use `2-PropZTest` to obtain the values in steps 4 and 5.