

MA 155 - Fall 2021

Homework 18

1a) $p = 0.88$

$$\alpha = 0.001$$

$$q = 1 - 0.88$$

$$= 0.12$$

$$n = 658$$

$$\hat{p} = \frac{554}{658}$$

$$= 0.84$$

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}}$$

$$= \frac{0.84 - 0.88}{\sqrt{\frac{0.88 \times 0.12}{658}}}$$

$$= -3.16 \rightarrow \text{test statistic}$$

b) $p\text{-value} = 0.0008$

c) The $p\text{-value}$ is smaller than α

d) ☒ reject the null

e) The sample data support the claim that the population is less than 0.88

$$2. H_0: p \leq 0.5$$

$$H_1: p > 0.5$$

The test is: left tailed

$$p = 0.5$$

$$q = 1 - 0.5$$

$$= 0.5$$

$$n = 200$$

$$\alpha = 0.005$$

$$\hat{p} = \frac{44}{100}$$

$$= 0.44$$

$$Z = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}}$$

$$= \frac{0.44 - 0.5}{\sqrt{\frac{0.5 \times 0.5}{200}}}$$

$$= -1.70 \rightarrow \text{test statistic}$$

$$\text{The p-value} = 1 - 0.9554$$

$$= 0.0446$$

$$p\text{-value} > \alpha$$

\therefore fail to reject the null hypothesis

$$3. p = 0.52$$

$$q = 0.48$$

$$n = 406$$

$$\alpha = 0.52 \quad 0.001$$

$$\hat{p} = \frac{222}{406}$$

$$= 0.55$$

$$a) z = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}}$$

$$= \frac{0.55 - 0.52}{\sqrt{\frac{0.52 \times 0.48}{406}}}$$

$$= 1.21 \rightarrow \text{test statistic}$$

$$b) p\text{-value} = 1 - 0.8869$$

$$= 0.1131$$

c) The p-value is greater than α

d) ☒ fail to reject the null

e) There is not sufficient sample evidence to support the claim that the accuracy rate for fingerprint identification is more than 0.52.

$$4. H_0: p \geq 0.5$$

$$H_1: p < 0.5$$

The test is: **left-tailed**

$$p = 0.5$$

$$q = 0.5$$

$$n = 300$$

$$\alpha = 0.05$$

$$\hat{p} = 0.42$$

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p \times q}{n}}}$$

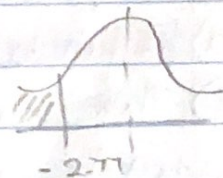
$$= \frac{0.42 - 0.5}{\sqrt{\frac{0.5 \times 0.5}{300}}}$$

$$= -2.77 \rightarrow \text{test statistic}$$

$$p\text{-value} = 0.0028$$

$$p\text{-value} < \alpha$$

Reject the null hypothesis



$$5. H_0: p \leq 0.3$$

$$H_0: p \leq 0.3$$

$$H_a: p > 0.3$$

$$p = 0.3$$

$$q = 0.7$$

$$n = 67$$

$$\alpha = 0.02$$

$$\hat{p} = \frac{22}{67}$$

$$= 0.33$$

$$= 0.33$$

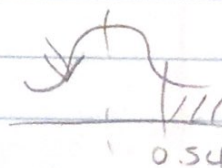
$$a) z = \frac{\hat{p} - p}{\sqrt{\frac{p \times q}{n}}}$$

$$= \frac{0.33 - 0.3}{\sqrt{\frac{0.3 \times 0.7}{67}}}$$

$$= 0.54 \rightarrow \text{test statistic}$$

$$b) p\text{-value} = 1 - 0.7054$$

$$= 0.2946$$



$$p\text{-value} > \alpha$$

fail to reject the null

There is not sufficient sample evidence to support the claim that the proportion of stocks that went up is more than 0.3.