

$$H_0: \mu = 50 \text{ mg}$$

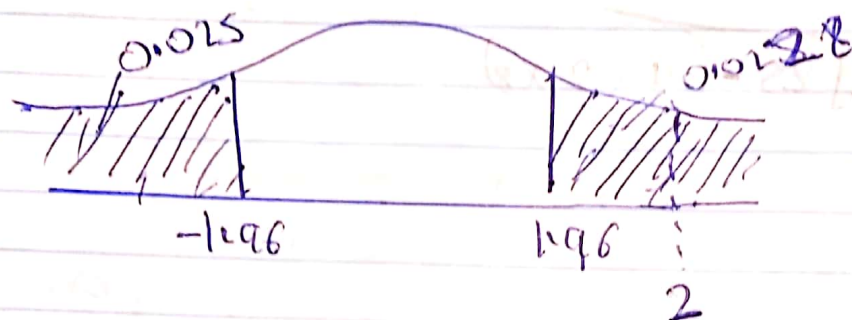
$$H_1: \mu \neq 50 \mu$$

$$\mu = 50 = (x) 6$$

$$\sigma_x = 20$$

$$n = 64$$

Use Z distribution $n > 30$ $\bar{x} = 55$



$$Z = \frac{\bar{x} - \mu}{\frac{\sigma_x}{\sqrt{n}}} = \frac{55 - 50}{\frac{20}{\sqrt{64}}} = \frac{5}{\frac{20}{8}} = 2$$

$$Z_{\text{calculated}} = 2$$

$$P\text{-Value} = 0.5 - (0.4772) = 0.0228$$

$$Z_{\text{critical}} = 1.96$$

Since $Z_{\text{calculated}}$ (2) is greater than Z_{critical} (1.96) then we reject the null hypothesis

Then there is no significance difference between the acidity level of the shop's sample and the standard acidity level

Since the P-value 0.0228 is less than 0.05 the null hypothesis is rejected

3

$$\mu = 265, n = 120, \bar{x} = 270, \sigma = 50$$

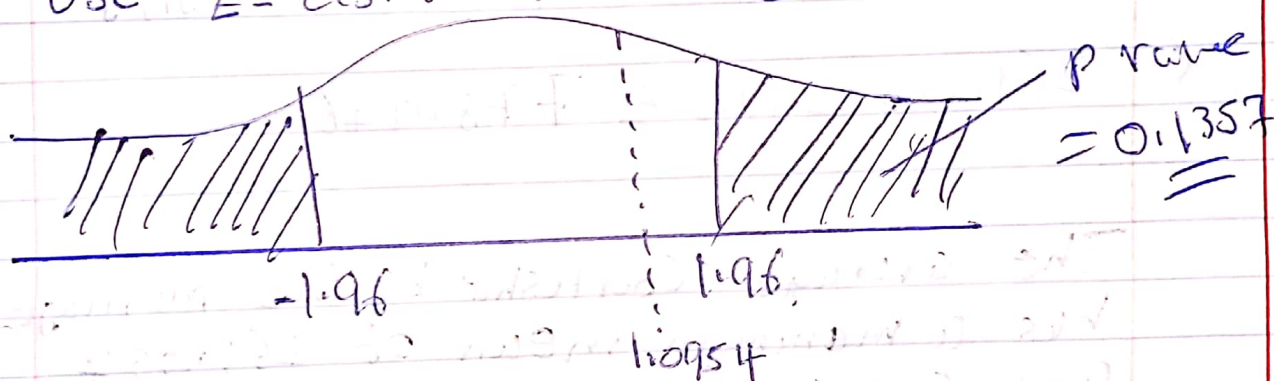
$$H_0: \mu = 265$$

The average courtship before first marriages is 265 days

$$H_a: \neq 265$$

The average courtship before first marriage is not 265 days

Use Z-distribution since $n > 30$



$$Z_{\text{calculated}} = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{270 - 265}{\frac{50}{\sqrt{120}}}$$

$$= \frac{5}{\frac{50}{\sqrt{120}}} = 1.0954$$

$$\text{From the table } p\text{-value} = 0.5 - (0.3643) = 0.1357$$

The null hypothesis is not rejected since $1.0954 < 1.96$ i.e. $Z_{\text{calculated}}$ is less than Z_{critical} .

B

We therefore conclude that the mean/average courtships before first marriages is 265 days

CONFIDENCE INTERVAL

$$\bar{x} - Z\sigma_{\bar{x}} \leq \mu \leq \bar{x} + Z\sigma_{\bar{x}}$$

$$270 - 1.96\left(\frac{50}{\sqrt{120}}\right) \leq \mu \leq \bar{x} + 1.96 \frac{50}{\sqrt{n}}$$

$$270 - 1.96\left(\frac{50}{\sqrt{120}}\right) \leq \mu \leq \overset{270}{\bar{x}} + 1.96 \frac{50}{\sqrt{120}}$$

$$* \quad 261.054 \leq \mu \leq 778.946$$

The average courtship before marriage has a minimum mean of 261.054 and a maximum mean of 778.946

2

$$n = 30 \quad \mu_1 = 5.5, \sigma_1^2 = 2.5$$

$$\mu_2 = 4, \sigma_2^2 = 1.75$$

H_0 : The mean sentence for men with ethnic-sounding first names is equal to the mean sentence for men with more-traditional sounding first names

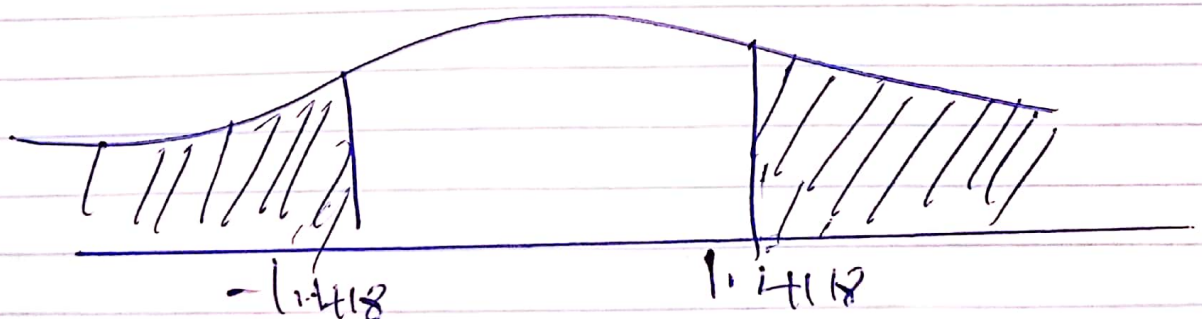
H_1 : The mean sentence for men with ethnic-sounding first names is ~~equal~~ not equal to the mean sentence for men with more-traditional sounding first names

$$H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

Use

$$\frac{5.5 - 4}{\sqrt{\frac{2.5}{30} + \frac{1.75}{30}}} = 1.4118$$



$$P\text{-Value} = 0.5 - (0.4222) = 0.0778$$

$$0.0778 > 0.05$$

Since the P Value $0.0778 < 0.05$
We reject the null hypothesis and
Conclude that the mean sentence for
men with ethnic-sounding first names
is different to that with men with
more traditional sounding first names

4

productivity.

H_0 : The employees were equal before and after lunch

H_1 : The employees productivity were not equal before and after lunch.

$$H_0: \bar{x}_1 = \bar{x}_2$$

$$H_1: \bar{x}_1 \neq \bar{x}_2$$

$$(\bar{x}_1 - \bar{x}_2) = \sum_{i=1}^n x_i = -1 + 1 + -2 + -3 + -3 + 1 = -7$$

$$\bar{x}_1 = \frac{1}{n} \sum x_i = 5 + 6 + \dots + 5 = \frac{31}{6} = 5.167$$

$$\bar{x}_2 = \frac{1}{n} \sum x_i = 4 + 7 + \dots + 6 = \frac{24}{6} = 4$$

$$\bar{x}_1 = 5.167$$

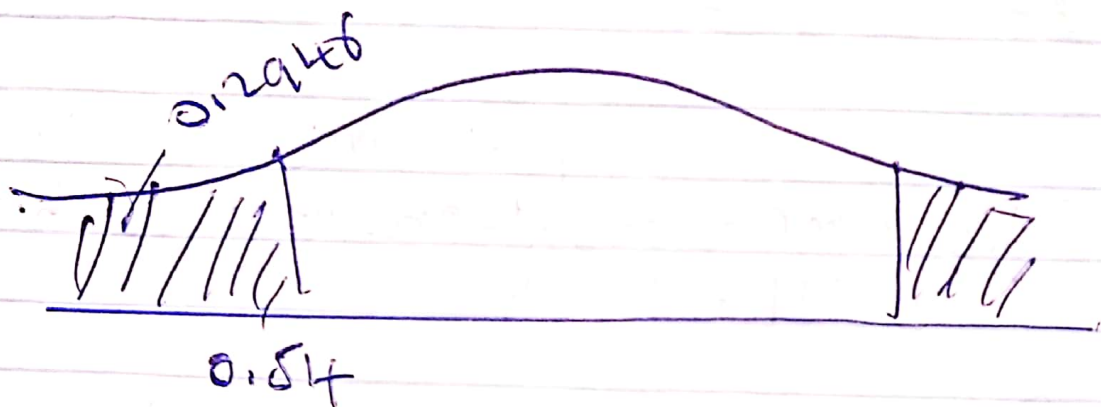
$$\bar{x}_2 = 4$$

$$s_{\bar{x}_1} = \frac{1}{n} (x_i - \bar{x}_1) = \frac{1}{n} (5 - 5.167) = 2.342$$

$$s_{\bar{x}_2} = \frac{1}{n} (x_i - \bar{x}_2) = \frac{1}{n} (4 - 4 + \dots + 6 - 4) = 1.967$$

$$s_{\bar{x}} = \frac{2.342 + 1.967}{2} = 2.1545$$

$$Z = \frac{5.167 - 4}{2.1545} = 0.5417$$



$$0.5 - 0.2054 = 0.2946$$

Since the p-value ($0.2946 > 0.05$) we fail to reject the null hypothesis and therefore the employees' productivity were equal before and after lunch.