Hypothesis Testing:-

1) $H_0 \Rightarrow \mu = 2.75$

$H_a \Rightarrow \mu \neq 2.75$
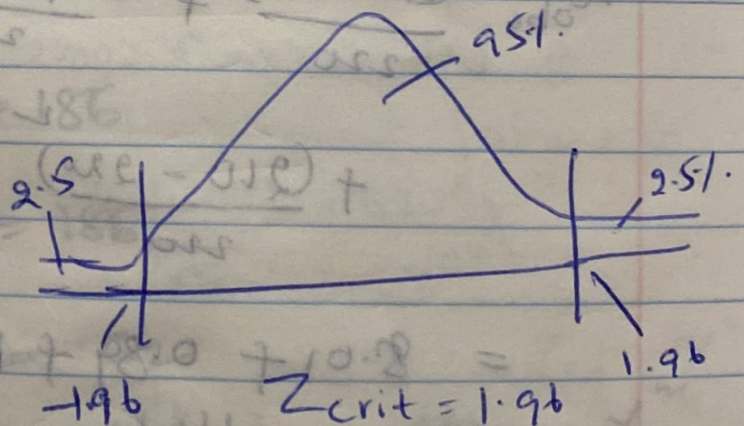
$n = 256$

$\bar{x} = \bar{X} = 2.85$

Sample SD $= 0.65$

$$Z = \frac{2.85 - 2.75}{0.65/\sqrt{256}} = \frac{0.1}{0.04} = 2.5$$

it is a two tailed test

$Z_{crit} = 1.96$

$2.5 > 1.96$

falling in tail region. Hence reject Null Hypothesis

$\therefore \mu \neq 2.75$

$\therefore$ GPA Changed as professor claimed.

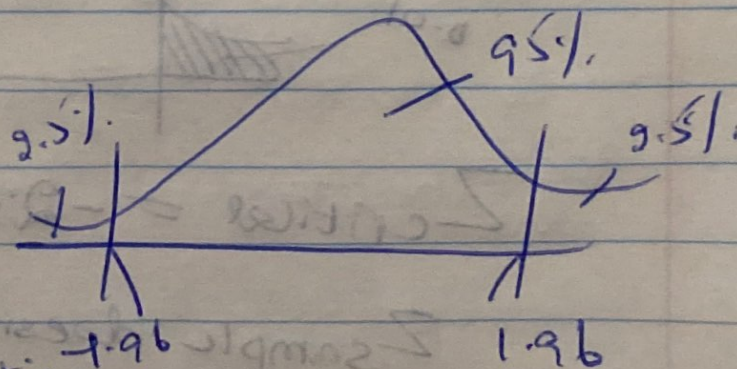2) $H_0 \Rightarrow \mu = 52$

$H_a \Rightarrow \mu \neq 52$

$$n = 100$$

$$\sigma_{pop} = 4.5$$

$$\sigma_{sample} = 4.5/\sqrt{100} = 0.45$$

$$Z_{sample} = \frac{52.8 - 52}{0.45} = \frac{0.8}{0.45} = 1.78$$

$Z_{critical}$ @ two tailed test, 0.05

$$= 1.96$$

$1.78 < 1.96$

doesn't fall in critical region

∴ don't reject Hₒ

∴ average price ≤ 52.

3) $H_0 \Rightarrow \mu < 34$

$H_a \Rightarrow \mu \geq 34.$

$\sigma_p = 8 \, ppm$

$n = 50$

$\bar{x} = 32.5 \, ppm$
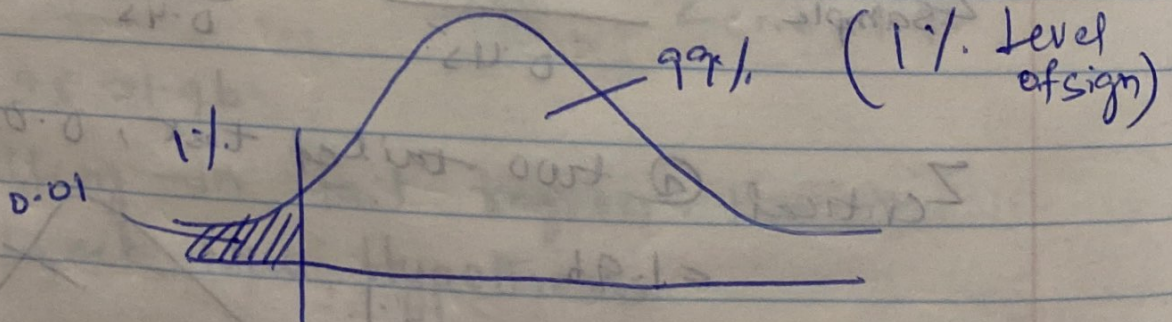
$\sigma_{sample} = \dfrac{\sigma_p}{\sqrt{n}} = \dfrac{8}{\sqrt{50}} = 1.13$

$Z_{sample} = \dfrac{32.5 - 34}{1.13}$

$= \dfrac{-1.5}{1.13}$

$= -1.33$

Negative tailed test

99% (1% Level of sign)

0.01

Z critical = -2.325

∴ Z sample doesn't fall in the tail reg⁰ⁿ

Hence Accept Ho

∴ μ < 34

their claim is accepted (lowered)

4)

	obs	exp	X^2	
5) Higgins	41	25	$(41-25)^2/25$	10·24
Reardon	19	25	$(19-25)^2/25$	1·44
White	24	25	$(24-25)^2/25$	0·04
Charlton	16	25	$(16-25)^2/25$	3·24
				14·96

X^2_{crit} @ 0·05, 3df = 7.815

14.96 > 7.815

falling in the tail Region

∴ Reject the claim (Ho)

∴ all the candidates aren't equally popular

7) $H_0 \Rightarrow \mu = 145 \Rightarrow \mu \leq 145$
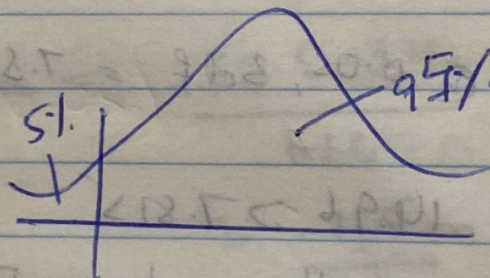 $H_a \Rightarrow \mu \neq 145 \Rightarrow \mu \geq 145$

   $\sigma_p = 20$

   $n = 200$

   $\bar{x} = 147$

$$Z_{sample} = \frac{\bar{x} - \mu}{\sigma_p / \sqrt{n}} = \frac{147 - 145}{20 / \sqrt{200}} = \frac{2}{1.41} = 1.41$$

Negative tailed test @ 0.05 significance level

$Z_{crit} = 1.65$

doesn't fall in tail Region

$\therefore$ don't reject H_0

avg height is ≤ 145 but not 147.
or is not higher as told or thought
by the teacher

8) $H_0 \to \mu \leq 145$

$H_a \to \mu > 145$

$$\sigma_p = 100$$

$$\bar{X} = 147$$

$$n = ?$$

Since there is no random sample information, it is not possible to determine if the claim is correct or not
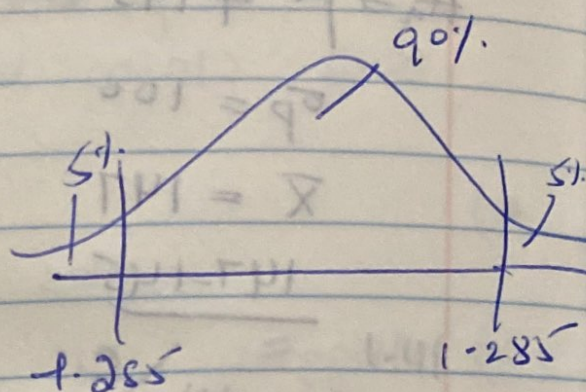
9) $H_0 \to \mu = 72$

$H_a \to \mu \neq 72$

$$n = 7$$

$$\bar{X} = \frac{70 + 69 + 73 + 68 + 71 + 69 + 71}{7} = 70$$

$$\sigma_{sample} = \sqrt{\frac{0 + 1 + 9 + 4 + 1 + 1 + 1}{7}} = \sqrt{\frac{17}{7}} = \sqrt{2.42}$$

$$= 1.55$$

$$Z_{sample} = \frac{70-72}{1.55/\sqrt{m}} = 1.29 \quad \frac{2}{0.58} = 3.41$$

$$Z_{crit} @ 1.2$$

two tailed $Z_{crit} @ 10\% (0.1)$
$$= 1.285$$

falls in tail region

∴ reject Ho
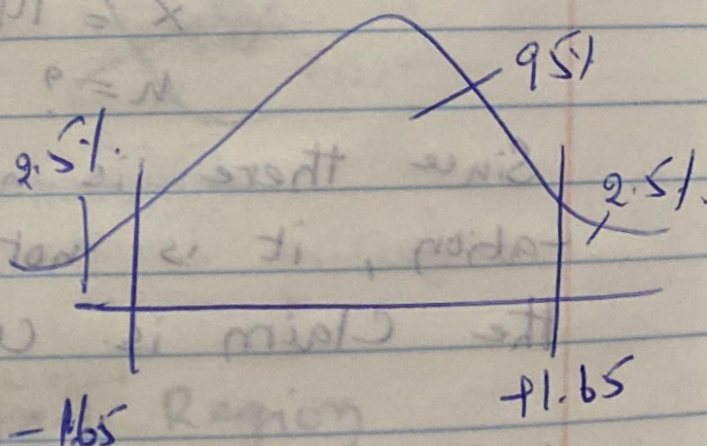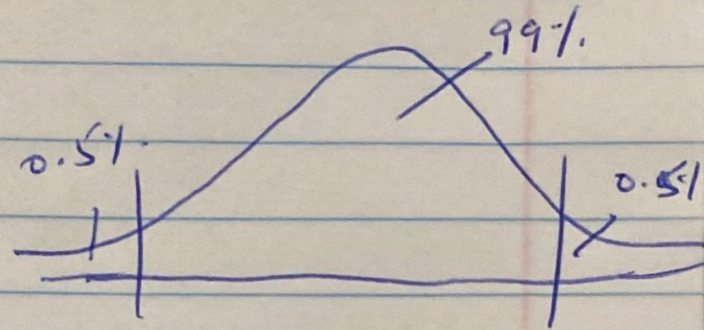
$Z_{crit} @ 5\% (0.05)$

$= 1.65$

falls in tail region

∴ Reject Ho

Z_{crit} @ 1% (0.01%)

= 2.33

falls in the tail region

∴ Reject Null Hyp.

at all levels Null is rejected

∴ $\mu \neq 72$

∴ it isn't by chance, distributor is
giving less than you deserve