Hypothesis Testing.

1. $\mu = 2.75$ $\quad \bar{x} = 2.85$

$\sigma = 0.65$ $\quad n = 256$

a) Null ⇒ grades remain same.

~~b)~~ Alternate ⇒ grades varied.

b) Standard Error $= \dfrac{0.65}{\sqrt{256}} = 0.04$

c) $$z = \frac{2.85 - 2.75}{0.04}$$

$$= 2.5$$

Since z score ~~f~~ at 95% CI significance is 2.

and $2.5 > 2$; reject null hypothesis.

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2. $\mu = 52$ $\quad \sigma = 4.50$

$n = 100$ $\quad \bar{x} = 52.8$

Null ⇒ mean is same

Alternate ⇒ mean varied.

$$z = \frac{\bar{x} - \mu}{\sigma} \Rightarrow \frac{52.8 - 52}{\frac{4.50}{\sqrt{100}}} = 1.78$$

At 5% level ~~of~~ of significance ; ⇒ 2

$1.78 < 2$, hence accept null hypothesis.

3. $\mu = 34$ Null hypothesis.

$\mu \neq 34$ Alternate hypothesis.

at 0.01 Significance

$\sigma = 8$

$n = 50$

$\bar{x} = 32.5$

$$z = \frac{32.5 - 34}{\frac{8}{\sqrt{50}}}$$

$$= -1.33$$

Since -1.33 less than ~~2.85~~ 2.58 (0.1% significance)

accept null hypothesis.

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5. Null hypothes: all candidates are equally popular.

Alternate hypothesis: not equally popular.

No. of voters = 100

Since 4 candidates ⟹ Expected No. of votes = 25.

Higgins = 41

Reardon = 19

White = 24

Charlton = 16

$$\chi^2 = 14.96$$

at 3df and 0.05 significance. ⟹ $\chi^2_{crit} = 7.815$

Since χ^2 greater than χ^2_{crit}, reject null hypothesis as all candidates are not equal.

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7. $\mu = 145$ cm Null hypothesis: $\mu \leq 145$

$\sigma = 20$ cm Alternate: $\mu > 145$

$n = 200$

$\bar{x} = 147$ cm

$$z = \frac{147-145}{\frac{20}{\sqrt{200}}} = 1.414$$

at 95% C.I (one-tailed because ≤ 145)

$$z_{crit} = 1.64$$

Since $z < z_{crit}$, accept null hypothesis.

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8. $\mu = 145$ Null : Mean is less than 145

$\sigma = 100$ Alternate : Mean is greater than 145.

$\bar{x} = 147$

$$z = \frac{147-145}{\frac{100}{\sqrt{144}}} = 0.24$$

at 0.05 significance; $z_{crit} = 1.64$ Since 1 sided test.

$0.24 < 1.64$, hence accept null hypothesis.

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9. a) Null hypothesis $\Rightarrow$ Recieving 72 ounces of cheese.

Alternate hypothesis $\Rightarrow$ Not 72 ounces.

b) $\mu = 72$; to determine $\bar{x} = \frac{70+69+73+68+71+69+71}{7}$

$\bar{x} = 70.143$ S.D $= 1.676$

n is small, use t_test.

$$t = \frac{70.143-72}{\frac{1.676}{\sqrt{7}}} \Rightarrow -2.9315.$$

c) df $= 6$

at 10% $\Rightarrow$ -1.9443 (Reject)

at 5% $\Rightarrow$ -2.447 (Reject)

at 1% $\Rightarrow$ -3.7 (Accept) Since less than $t = -2.9315$.
