Task statistics 2 modified

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Q1:

1- Null Hypothesis: The statement assumed to be true until proven otherwise

2- Alternatives: The statement we consider, when we reject the Null hypothesis

3- Type I Errors: rejecting H_0 when it's actually true

4- Type II Errors: Accepting H_0 when it's actually false

- Level of significance (α): maximum level of rejecting H_0, or, the threshold after which we can accept H_0.

Q2:

$H_0: \mu \geq 7.4 \qquad H_1: \mu < 4$

$$SE = \frac{0.6}{\sqrt{36}} = 0.1 \qquad z = \frac{4.3 - 4}{0.1} = 3$$

$$P = 1 - z(3) = 0.135\% < \alpha$$

then, reject H_0, adopt $H_1 \rightarrow \mu < 4$

Q3:

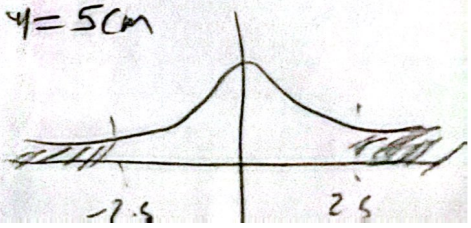
$H_0: \mu = 5cm \qquad H_1: \mu \neq 5cm$

$$SE = \frac{0.3}{\sqrt{25}} = 0.06 \qquad z = \frac{4.85 - 5}{0.06} = -2.5$$

$$P = 2[1 - z(2.5)] = 1.242\% < \alpha$$

reject H_0, no enough evidence that $\mu = 5cm$

rejection region



$\frac{1}{\sqrt{40}} = 0.1265$ $\quad z = \frac{6.7 - 7}{0.1625} = -1.846$

$P = z(-1.846) = 3.288\%$

No enough evidence that highschool student sleep at least 7 hrs. → reject H_0, Adopt H_1

Q58

- one tailed: H_0 is an interval, not a specific value
- Two tailed: H_0 is a specific value

ex on one tailed: On average, Egyptians sleep atleast 8 hrs a day

ex on two tailed: average salary of data scientists is $1000 monthly

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H_0: $\mu \geq 12$ $\quad H_1$: $\mu < 12$

$SE = \frac{1.5}{\sqrt{10}} = 0.474$ $\quad t = \frac{13-12}{0.474} = 2.11$

$df = n - 1 = 9$ $\quad t(0.01) = 1.383$

$t > t(0.01)$, then, no enough evidence to reject H_0

∴ the claim that battery lasts longer than 12 hours is proven to not be false