

Task Statistics 2

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Q1:

1:

Null Hypothesis: statement about a population parameter that we assume true unless data doesn't agree with it.

2:

The statement we consider if the null hypothesis were proven false

3:

Rejecting the null hypothesis when it's actually true

4:

Accepting the null hypothesis when it's actually false

5:

It's the value before which we can't accept the null hypothesis, and after which we can accept it

Q2,Q3:

Q28 $\bar{x} = 4.3$ $s = 0.6$ $n = 36$, $\alpha = 0.05$
 $H_0: \mu = 4$ $H_a: \mu > 4$

$$SE = \frac{s}{\sqrt{n}} = \frac{0.6}{6} = 0.1$$

$$z = \frac{\bar{x} - \mu}{SE} = \frac{4.3 - 4}{0.1} = 3$$

for $\alpha = 0.05$ $z_{0.95} = 1.645$

$$z = 3 > 1.645 \rightarrow \text{reject } H_0$$

we proved that 95% level that the drink
 increase alertness for 4+ hours

Q38 $\bar{x} = 4.85$ $s = 0.3$, $n = 25$ $\alpha = 0.01$

$$H_0: \mu = 5$$
 $H_a: \mu \neq 5$

$$SE = \frac{s}{\sqrt{n}} = \frac{0.3}{5} = 0.06$$

$$t = \frac{\bar{x} - \mu_0}{SE} = -2.5$$

Rejection region (two tailed $\alpha = 0.01$): $t = \pm 2.797$

$$|t| < 2.797 \rightarrow \text{reject } H_0 \rightarrow \text{Failed}$$

Conclusion: no enough evidence to conclude the true mean
 differs from 5 cm

Q4:

Q43 $\bar{x} = 6.7$ $s = 0.8$ $n = 40$ $\alpha = 0.05$
 $H_0: \mu = 7$ $H_a: \mu < 7$

$$SE = \frac{0.8}{\sqrt{40}} = 0.12649$$
$$t = \frac{6.7 - 7}{0.1265} = -2.372$$

$df = 39$ $P\text{-value is } P(T_{39} \leq -2.372)$
 $= 0.077$

$P = 0.077 > 0.05 \rightarrow \text{reject } H_0$
then there's an evidence that high school
students sleep less than 7 hours

Q5:

One-tailed checks for effect in one direction, ex: a drug increases headache.

Two-tailed test: checks for effect in two directions, ex: coffee changes blood pressure(it may increase or decrease)