Homework #9 Solutions

6.48, 6.49, 6.65, 8.2, 8.10, 8.19

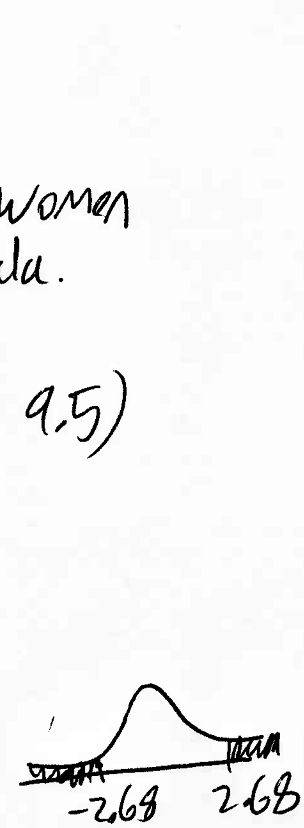
Problem 6.48

Let μ = mean blood calcium level for women who are pregnant in rural Guatemala.

(a) $H_0: \mu = 9.5$ (don't differ from 9.5)

$H_A: \mu \neq 9.5$ (differs from 9.5)

(b) test statistic is



$$z = \frac{9.58 - 9.5}{0.4/\sqrt{180}} = 2.68$$

Since H_A is $\mu \neq 9.5$

$$\begin{aligned} \text{Pvalue} &= 2P(Z > |2.68|) \\ &= 2P(Z > 2.68) \\ &= 2(1 - P(Z < 2.68)) \\ &= 2(1 - .9963) \\ &= .0074 \end{aligned}$$

Since the Pvalue = .0074 is small we have strong evidence against H_0. Ie we conclude that the mean blood calcium level is not 9.5 for the pregnant women in rural Guatemala.

(c) A 95% CI for μ is given by

$$9.58 \pm 1.96\left(\frac{0.4}{\sqrt{180}}\right)$$

$\Rightarrow 9.58 \pm 0.0298$ (4dp)

$\Rightarrow (9.5502, 9.6098)$

Problem 6.49

Let μ = mean ORP score for third graders in this suburban school district

First need $\bar{x}$. $\Sigma x = 1544 \Rightarrow \bar{x} = 35.0910$ (4dp)

(a) $H_0 : \mu \leq 32$ (mean score is same or less than national average)

$H_A : \mu > 32$ (mean score higher than national average)

(b) Test statistic: $z = \dfrac{35.0910 - 32}{11/\sqrt{44}} = 1.86$

Since $H_A: \mu > 32$ Pvalue $= P(Z > 1.86) = 1 - P(Z < 1.86)$

$= 1 - .9686$

$= .0314$

So would conclude that the mean for this school district is indeed higher than the national average.

Problem 6.65

(a) Let μ = mean amount of sugar in hindguts of cockroaches

$H_0: \mu = 7$

$H_A: \mu \neq 7$

Since 95% CI is 4.2 ± 2.3 ie $(1.9, 6.5)$ does not contain 7 we would conclude at the 5% level of significance that the mean is not equal to 7

(b) If instead we tested

$H_0: \mu = 5$

vs

$H_A: \mu \neq 5$

Since 5 is inside the confidence interval we could not reject the null hypothesis at the 5% level of significance.

Problem 8.2

Let p = proportion of people in population who intend to buy clothing as their first choice

$$\hat{p} = \frac{487}{811} = 0.6005 \quad (4dp)$$

a 99% CI is given by

$$0.6005 \pm 2.576 \sqrt{\frac{.6005(1-.6005)}{811}}$$

$$\Rightarrow 0.6005 \pm 0.0443$$

$$\Rightarrow (.5572, .6448)$$

Problem 8.10

Let p = proportion of trees that will die if receive this treatment

$$\hat{p} = \frac{41}{216} = 0.1898 \quad (4dp)$$

A 95% CI for p is given by

$$\Rightarrow .1898 \pm 1.96 \sqrt{\frac{.1898(1-.1898)}{216}}$$

$$\Rightarrow .1898 \pm .0523 \Rightarrow (.1375, .2421)$$

Problem 8.19

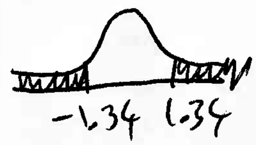
Let p = probability that coin comes up heads

$$\hat{p} = \frac{5067}{10000} = .5067$$

(a) $H_0: p = 0.5$

$H_A: p \neq 0.5$

test statistic is $z = \dfrac{.5067 - .5}{\sqrt{\dfrac{.5(1-.5)}{10000}}} = 1.34$



$$\text{Pvalue} = 2P(Z > |1.34|) = 2P(Z > 1.34)$$
$$= 2(1 - P(Z < 1.34))$$
$$= 2(1 - .9099)$$
$$= .1802$$

Since the Pvalue is larger than .05 cannot reject the null hypotheses. ie no evidence to show the probability of getting heads differs from .5.

(b) A 95% CI for p is

$$.5067 \pm 1.96\sqrt{\frac{.5067(1-.5067)}{10000}}$$
$$\Rightarrow .5067 \pm .0098 \Rightarrow (.4969, .5165)$$