STAT S 520
HOMEWORK 7
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Question 9.6.6:

Given,
mean value = 800
n value = 100
$\bar{x}$ = 745.1
s = 238.0
α = 0.05

Null Hypothesis : H_0 = mean $\geq$ 800

Alternative Hypothesis : H_1 = mean < 800

t = $\frac{745.1 - 800}{\frac{238}{10}}$

t = -2.306

p = ϕ(-2.306)

R CODE: pnorm(-2.306) = 0.01055532 < 0.05

Therefore, we reject the null hypothesis.

Question 9.6.7 :

Given,
mean value = 0
n value = 60
$\bar{x}$ = -0.1833
s = 5.18633
α = 0.05

Null Hypothesis : H_0 = mean = 0

Alternative Hypothesis : H_1 = mean ! = 0

t = $\frac{0.1833 - 0}{\frac{5.18633}{\sqrt{60}}}$

$$t = \frac{0.1833}{0.6695}$$

t = 0.273

p = 2 $\phi(-2.703)$

R CODE: 2 * pnorm(-0.273)

Output : 0.7848532 > 0.05

Hence, cannot reject the null hypothesis.

Question 9.6.8:

True, since the student uses a fair coin the probability of the heads occurring is 0.5.

Given that each student constructs a confidence interval of level 0.95.

Therefore, 0.95 * 600 = 570.

Question 9.6.9:

Given,

L = 2

1 - α = 0.99

α = 0.01

RCODE: q = qnorm(1 - (0.01/2))

We know that

$$n = \left(\frac{2 * q * \sigma}{L}\right)^2$$

$$n = \left(\frac{2 * 2.575829 * 6}{2}\right)^2$$

n = 238.856

Thus, the SAHC should plan to take 239 measurements.

Question 5:

a. If we consider **p** as the probability that he gets the correct symbol, then

   Null Hypothesis : **p** $\leq$ 0.2

   Alternative Hypothesis : p > 0.2

b. We need to calculate P(correct symbols identified $\geq$ 25)

   R CODE: 1 - pbinom(24,100,0.2)

   Output: 0.1313532

   Thus, the probability that they identify 25 or more symbols correctly is 0.1313532.

c. Since, the probability that a person without psychic powers can identify more than 25 symbols correctly is 13%, a number not too small - we can conclude that the person does not have psychic powers.

Question 6:

Here,

α = 0.05

n = 1009

$\bar{x_n}$ = 0.58

R CODE: q = qnorm(1-0.025)

q = 1.959964

$s_n = \sqrt{1 - 0.58} = \sqrt{0.42}$

Confidence Interval = $\left(0.58 - 1.95 * \frac{\sqrt{0.42}}{\sqrt{1009}}, 0.58 + 1.95 * \frac{\sqrt{0.42}}{\sqrt{1009}}\right)$

Confidence Interval = (0.5402, 0.6197)

Thus, about 54% to 61% of all US adults support same sex marriage.