Math 166 HW 5

1 $H_0: \mu = 95$ $H_1: \mu \neq 95$ $\bar{y}$ = sample mean

Since $\alpha = 0.06$, have 94% confidence

Want when $P\left(I > \frac{\bar{y} \pm \mu}{15/\sqrt{22}}\right) = 0.03 \to$ as 2 sided

$$\frac{\bar{y} \pm 95}{15/\sqrt{22}} = Z_{0.03}$$

$z_{0.03} \doteq 1.88$

$$\bar{y} = \frac{15}{\sqrt{22}} 1.88 + 95 = 101.012$$

For both bounds, $95 \pm \frac{15}{\sqrt{22}} z_{0.03} = 88.988$, rejected if meaning $\bar{y}$ should be $\bar{y} < 88.988$ or $\bar{y} > 101.012$

2 $H_0: \mu = 32{,}500$ $H_1: \mu > 32{,}500$

$\alpha = 0.05$

$$P\left(\frac{\bar{y} - \mu}{4000/\sqrt{15}} < Z\right) = 0.05$$

$$\bar{y} - 32{,}500 = \frac{4000}{\sqrt{15}}(1.64)$$

$$\bar{y} = \frac{4000}{\sqrt{15}}(1.64) + 32{,}500$$

$$\bar{y} = 34193$$

34193 > 33800, so the company cannot claim the difference is statistically signifigant.

3 $H_0: \mu = 120$ $H_1: \mu > 120$, $\bar{y} = 125.2$

and $\sigma = 12/\sqrt{50}$,

Since confidence isn't listed, I will use $\alpha = 0.05$, so the equation of the upper bound is $\frac{\bar{y} - 120}{12/\sqrt{50}} = Z_{0.05}$, $\bar{y} = 122.783$

Since sample mean $= 125.2$ and upper bound for $\alpha = 0.05 = 122.783$, Rosaura should reject H_0.

4) $H_0: p = 0.67$, $H_1: p \neq 0.67$

To see if large sample works here

$np_0 + 3\sigma = .67(35) + 3(2.782) = 31.795 < 35$

$np_0 - 3\sigma = .67(35) - 3(2.782) = 15.1047 > 0$

large sample works, the CLT can be applied, $\alpha = 0.05$, and 2 sided, want $Z_{0.025}$

We should reject H_0 if sample $\geq Z_{0.025}\sigma + p$

or if sample $\leq -Z_{0.025}\sigma + p$

$Z_{0.025} = 1.96$, $\sigma = \sqrt{35(.67)(1-.67)} = 2.782$

lower bands $= .67(35) \pm 1.96(2.782) = (17.998$ to $28.903)$

Since $17.998 \leq 18 \leq 28.903$, we cannot reject H_0.

5 If $n = 200$, $H_0: p = 0.45$, $H_1: p > 0.45$,

we reject H_0 when $\bar{y}$ is

$\bar{y} > \sigma Z_{0.14} + p$, $p = 90$, $\sigma = \sqrt{200(.45)(.55)} = 7.04$

and $Z_{0.14} = 1.08$

$\bar{y} \geq 90 + 1.08(7.04) = 97.603$

so if $\bar{y} \geq 98$, then we will reject H_0

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