MA331 Homework 4 - Aparajita Rana

I pledge my honor that I have abided by the Stevens Honor System. - Aparajita Rana

6.58 - Computing P-value, $\mu = \mu_0 \rightarrow z = 1.77$

(a) $\mu > \mu_0 \Rightarrow P(z > 1.77) = 0.038$ [above]

(b) $\mu < \mu_0 \Rightarrow P(z < 1.77) = 0.962$ [below]

(c) $\mu \neq \mu_0 \Rightarrow P(|z| \geq 1.77) = 0.038 * 2 = 0.0762$

6.59 - $\mu = \mu_0 \rightarrow z = -1.69$ (given)

(a) $\mu > \mu_0 \Rightarrow P(z > -1.69) = 0.955$

(b) $\mu < \mu_0 \Rightarrow P(z < -1.69) = 0.0455$

(c) $\mu \neq \mu_0 \Rightarrow P(|z| \geq -1.69) = 0.091$

6.71 - Attitudes towards School

Scores range 0-200, mean = 115, SSHA mean = 127.8

(a) $\sigma = 30$, $H_0 = \mu = 115$, $H_a: \mu > 115$, $z = \frac{127.8 - 115}{(30/\sqrt{25})} = 2.13$

$P(z > 2.13) = 0.017$

The hypothesis that older students have better attitudes is wrong/rejected because the p-value is less than α

(b) Assump #1: ~~Random & Simple~~ Simple & Random Sample (SRS)

Assump #2: Normal Distribution

Assumption 1 is more important because there were no crazy outliers that could/would make Normal Distribution matter too much.

6.73 - Are the measurements similar?

(a) $H_0: \mu = 0$ mpg, $H_a: \mu \neq 0$ mpg

(b) $\bar{x} = 2.73 \rightarrow z = \frac{2.73 - 0}{3/\sqrt{20}} = 4.069$ P-val = 0.00002

P-val too small $\Rightarrow H_0$ is rejected $\therefore \Rightarrow H_a: \mu \neq 0$

6.99 - Practical sig & sample size

(a) $\bar{x} = 2,453.7$, 100 athletes, $\frac{(2453.7 - 2403.7)}{880/\sqrt{100}} = 0.57$

$\therefore P(z > 0.57) = \boxed{0.284}$

(b) $\bar{x} = 2,453.7$, 600 ath, $\frac{(2453.7 - 2403.7)}{880/\sqrt{600}} = 1.27$

$\therefore P(z > 1.27) = \boxed{0.102}$

(c) $\bar{x} = 2,453.7$, 2500 ath, $\frac{(2453.7 - 2403.7)}{880/\sqrt{2500}} = 2.84$

$\therefore P(z > 2.84) = \boxed{0.002}$

6.120 - Choose the appropriate distribution

(a) reject H_0 when p_0 is correct: $P(\text{Type I Error}) = P(X=0 \cup X=1 \cup X=2)$
$= 0.1 + 0.1 + 0.2 = \boxed{0.4}$

(b) $P(\text{Type II Error}) = P(X=3 \cup X=4 \cup X=5 \cup X=6) = \boxed{0.4}$

7.22 - One-sample t test

(a) degrees of freedom = 15

(b) 2.131 & 2.249 $(2.131 < t < 2.249)$

(c) 0.02 and 0.025 $(0.02 < p < 0.025)$

(d) value $t = 2.15$ at 5% level $\Rightarrow$ Yes - significant
1% level $\Rightarrow$ No - not sig

(e) p-value $\approx$ 0.0241

7.23 - Another one-sample t test

(a) degrees of freedom for $t = 26$

(b) 1.706 & 2.056 $(1.706 < t < 2.056)$

(c) 0.05 & 0.1 $(0.05 < p < 0.1)$

(d) value $t = 2.01$ at 5% level $\Rightarrow$ No
1% level $\Rightarrow$ No

(e) p-value $\approx$ 0.055