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STAT 641
Assignment 07
11/23/21

Read 11.0.12, Devore Book Ch 8:

1.)

1.1) $\left| \frac{\sqrt{n}(\bar{Y}-20)}{\sigma} \right| > t_{\alpha/2}$ $H_0: \mu = 20$, $H_1: \mu \neq 20$

1.2.) $G(-t_{\alpha/2}) + 1 - G(t_{\alpha/2})$

- $y(19.9) = 0.227$, $y(19.95) = 0.093$, $y(19.99) = 0.052$
- $y(20) = 0.05$, $y(20.05) = 0.093$, $y(20.1) = 0.227$, $y(20.15) = 0.442$
- $y(20.2) = 0.697$, $y(20.25) = 0.856$, $y(20.3) = 0.952$,
- $y(20.4) = 0.998$, $y(20.5) = 0.999998$

* see end of pdf for sketch of power curve.

1.3.) power.t.test(n=, delta=0.15, sd = 0.43, sig.level = 0.05, power = 0.8, type = c("one.sample"), alternative = c("one.sided")

=> $n = 53$

2)

2.1) $H_0: \mu_0 = 10$ $H_1: \mu_0 < 10$, $\bar{y} = 8.7$, $s = 2$, $n = 15$, $\alpha = 0.01$

$$T = \frac{\sqrt{15}(8.7-10)}{2} = -2.52$$

pvalue = pt(T, n-1) = 0.012

- There is not sufficient evidence to reject the null using $\alpha = 0.01 <$ pvalue $= 0.012$

2.2) $\Delta = \frac{\sqrt{15}(1.5-8.5)}{2}$ $\quad y(\mu) = 0.616$

2.3) looking at H.0.12, pg 29 Table A11 we see

$n = 27$

3.)

(3.1.) TS = 9.2, p-value = 0.00887 < Yes, there is significant evidence ($\alpha = 0.10$) that the standard deviation from the insurance is less than 10.

(3.2) *see R for computation:

$y(5) = 0.00002687706$, $y(6) = 0.0087725504$, $y(7) = 0.1280751$

$y(8) = 0.43518158$, $y(9) = 0.7340757$, $y(10) = 0.90$.

(3.3) $\sqrt{\frac{(n-1)s^2}{\chi^2_{\alpha/2}}}$ => in R: sqrt(((length(x)-1)* var(x))/qchisq(0.5, length(x)-1)) = 5.151741

* only for above this

4.)

(4.1) see R for computation:

$s_+ = 10$, pbinom(s_+, length(x), 0.5) = 0.2121781 => fail to reject null.

qbinom(0.05, length(x), 0.5) = 8 > 10 = s_+ => fail to reject null.

(4.2) see R for computation:

$w_{n,1-\alpha}$ = qsignrank(x, n, True) = 101 < w_+ = 112.5 ; p-value = 0.09540713

=> fail to reject null.

(4.3) $\bar{y} + t_{\alpha/2}\frac{s}{\sqrt{n}}$ => $118 + 1.711\frac{sd(x)}{\sqrt{25}}$ = 120.519.

5.) * see R for computation

(5.1) (0.8668265, 0.9731735)

(5.2) Yes, there is significant evidence that the improved method has increased the accuracy over the current method as the old accuracy 0.80 is below the lower bound of our 95% CI for the accuracy of the new method.

(5.3) $y(0.75) = 0.03762626$, $y(0.80) = 0.27118896$, $y(0.85) = 0.67246294$

$y(0.90) = 0.96010947$, $y(0.95) = 0.[illegible]$

(5.4) See R for calculation: n = 83

6) (6.1) A

(6.2) C

(6.3) C

(6.4) B

(6.5) D

(6.6) C

(6.7) A

(6.8) B

(6.9) B