Lab #7 – Cañada M200 Sp13

Data Set #1

1) Point Estimate $\bar{x} = \frac{\Sigma x}{n} = \frac{201.2}{10} = 20.12$ oz.

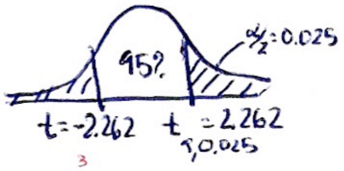
Plug data into calculator and calculate 1VarStat on the data

2) Standard Deviation $s = \sqrt{\frac{10(4492) - (201.2)^2}{10(9)}} = 7.0226340$ oz.

Also from 1 Var-Stat

Note: $\sigma_x = 6.66225$ is not the pop. std. of this b/c it is not a population.

3) Confidence Interval:
b/c σ is unknown
$\bar{x} \sim t_9(\mu, 7.02263/\sqrt{10})$

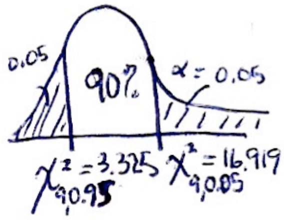


$E = \frac{2.262(7.022630)}{\sqrt{10}} = \frac{15.88518906}{\sqrt{10}} \doteq 5.023338$

$\bar{x} \pm E \Rightarrow 20.12 \pm 5.023$

$15.10 < \mu < 25.14$ ounces

4) Confidence Interval for std. dev.
This is the only data set for which this question is appropriate because the data is quantitative & std dev. of pop. is unknown.



$$\sqrt{\frac{9(7.02263)^2}{16.919}} < \sigma < \sqrt{\frac{9(7.02263)^2}{3.325}}$$

(443.8559891)

$$\sqrt{26.234174} < \sigma < \sqrt{133.490523}$$

$5.12 < \sigma < 11.55$ ounces

Assumptions: The data must be normally distributed in order for the interval to be valid. In addition typical randomness is also assumed.

Lab#7 – Cañada M200 Sp13 p.2

Data Set #2

1) Point Estimate $\hat{p} = \frac{62}{84} \doteq 0.738095$

This is qualitative data therefore a proportion is correct

2) State x, n & q-hat

Since this is qualitative data the standard deviation is not needed

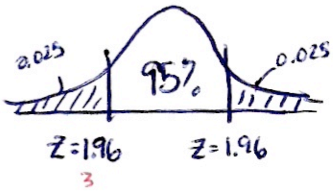
$x = 62$

$n = 84$

$\hat{q} = 1 - \hat{p} = \frac{84-62}{84} = \frac{22}{84} \doteq 0.261905$

3) Confidence Interval

Since proportions are being estimated $\hat{p} \sim N(p, \sqrt{\frac{pq}{n}})$



$E = 1.96\sqrt{\frac{62(22)}{84^3}}$

$= 1.96(0.047972)$

$\doteq 0.094025$

$\hat{p} \pm E \Rightarrow 0.7381 \pm 0.0940$

$0.644 < p < 0.832$

4) Not appropriate b/c qualitative

Data Set #3

1) Point Estimate $\bar{x} = \frac{\Sigma x}{n} = \frac{963.5}{15} = 64.2\overline{33}$ in.

Quantitative data use data editor & 1VarStat

2) Standard Deviation $s = \sqrt{\frac{15(61942.75) - (64.25)^2}{15(14)}} \doteq 1.962748$ in.

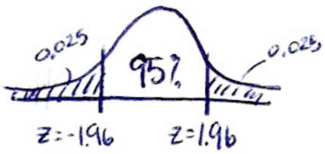
I asked for sample std dev. but it is important to not that pop. std dev. is known.

$\sigma = 2.5$ inches

$\sigma_{\bar{x}} = 1.89619502$ is meaningless b/c this is a sample.

3) Confidence Interval

Since quantitative approx. μ & σ known $\bar{x} \sim N(\mu, 2.5/\sqrt{15})$



$E = \frac{1.96(2.5)}{\sqrt{15}}$

$= 1.265175$

$\bar{x} \pm E \Rightarrow 64.233 \pm 1.265 \Rightarrow$

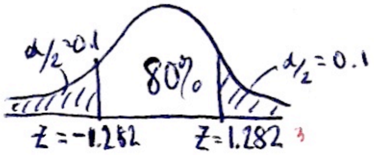
$62.97 < \mu < 65.50$ inches

4) There's no point in doing this since σ is known!

Lab #7 – M200 Sp13 Cañada

Data Set #4

	Men	Women	
	$\sigma_M = 2.8$ in.	$\sigma_W = 2.5$ in.	see problem #3
1	$n_M = 16$	2 $n_W = 15$	
	$\bar{x}_M = 69.7$	$\bar{x}_W = 64.2\overline{33}$	



$\bar{x} \sim N(\mu_M - \mu_W, \sqrt{\sigma_M^2/n_M + \sigma_W^2/n_W})$

$\bar{x}_M - \bar{x}_W \pm E \implies (69.7 - 64.233) \pm 1.221$

$E = 1.282\sqrt{\frac{2.8^2}{16} + \frac{2.5^2}{15}}$

5.467 ± 1.221

$= 1.282(0.9521904571)$

$= 1.220708$

4 $4.25 < \mu_M - \mu_W < 6.69$ in

Note:

Calculator Check for Data Set

#1 [STAT] → [TESTS] → TInterval

Input: [Data] STATS
List: L_1
Freq: 1
C-Level: 0.95
[Calculate] ↵

Output: TInterval
(15.096, 25.144)
$\bar{x} = 20.12$
S = 7.022630087
n = 10

#2 [STAT] → [TESTS] → 1PropZInt

Input: x = 62
n = 84
C-Level: 0.95
[Calculate] ↵

Output: 1-PropZInt
(0.64407, 0.83212)
$\hat{p} = 0.7380952381$
n = 84

#3 [STAT] → [TESTS] → ZInterval

Input: [DATA] STATS
σ = 2.5
List: L_2
Freq: 1
C-Level: 0.95
[Calculate] ↵

Output: ZInterval
(62.968, 65.498)
$\bar{x} = 64.2\overline{33}$
S = 1.962748316
n = 15

Lab # 7 – Cañada M200 Sp13 p.4

Continued Calculator Checks

Data Set #4: [STAT] → [TESTS] → 2-SampZInt

Input: [DATA] [STAT]

σ_1 : 2.8

σ_2 : 2.5

$\bar{x}_1 = 69.7$

$n_1 = 16$

$\bar{x}_2 = 64.233$

$n_2 = 15$

C-Level: 0.80

[Calculate] ↵

Output: 2-SampZInt

(4.2467, 6.6873)

$\bar{x}_1 = 69.7$

$\bar{x}_2 = 64.233$

$n_1 = 16$

$n_2 = 15$