

Out of 72 pts

STA 2023 Test Chapter 20-23

Name Key

For question #1, show all work for partial credit including calculator keystrokes when used. Assume all conditions have been met. **Do not round. Show all decimal digits.** All confidence intervals and hypothesis tests should be calculated by hand for question #1.

1. Valencia College boasts about having small class sizes and states the average class size is 23 students on their webpage. From a random sample of 41 classes on East Campus, the average number of students per class was 22.2 with a standard deviation of 4.2.

$$\mu = 23$$

$$\bar{x} = 22.2 \quad S_x = 4.2$$

$$n = 41$$

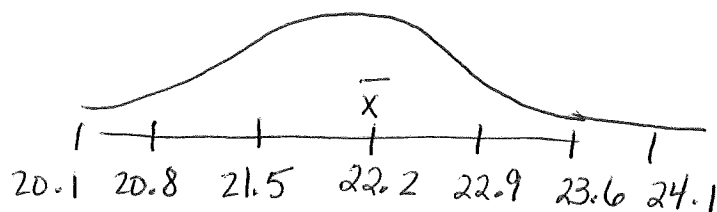
② *Picture*

a. Sketch a graph and create a 90% confidence interval for the average class size at Valencia College using $t=1.684$.

① $n = 41$

① $\bar{x} = 22.2$

① $S_x = 4.2$



② $SD = \frac{S_x}{\sqrt{n}} = \frac{4.2}{\sqrt{41}} = 0.6559297999$ → (A)

② $CI = \pm t * SD + center$
 $\pm 1.684 (A) + 22.2$

$(21.09541422, 23.30458578)$

② b. Use your confidence interval to determine if you support the claim from the college. *Yes, 23 is in the interval.*

Question #1 continued, show all work for partial credit including calculator keystrokes when used. Assume all conditions have been met. **Do not round.**

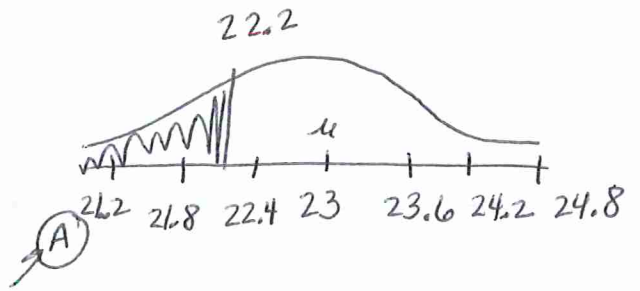
Show all decimal digits. All confidence intervals and hypothesis tests should be calculated by hand for question #1.

c. Your sample mean is smaller than Valencia's reported average class size. Perform a hypothesis test to test if there is evidence to support class size is smaller than 23. State your null and alternative hypothesis and sketch the graph.

2 picture

③ $H_0: \mu = 23$

③ $H_A: \mu < 23$



② $SD = \frac{Sx}{\sqrt{n}} = \frac{4.2}{\sqrt{41}} = 0.6559297999$

② $t = \frac{\text{data-center}}{SD} = \frac{22.2 - 23}{\text{A}} = -1.219642712$
not unusual

② $df = n - 1 = 41 - 1 = 40$

② $p\text{-value} = t_{cdf}(-100, \text{B}, 40) = 0.1148715972 > 5\%$

d. State your conclusion based on your hypothesis test.

② Do not reject H_0

There is not evidence that class size is smaller than 23.

For the remaining questions of the exam, use your calculator STAT menu. Assume all conditions have been met. **Do not round. Show all decimal digits.**

2. A city ballot includes a local initiative that would legalize gambling. The issue is hotly contested. A local newspaper conducts a poll of 1200 randomly selected voters and 53% said they would vote "Yes" to legalize gambling.

$$\begin{aligned}n &= 1200 \\ \hat{p} &= 0.53 \\ x &= 0.53(1200) \\ x &= 636\end{aligned}$$

a. Find a 90% confidence interval.

(3)

$$\begin{aligned}\text{STAT TESTS} \# A (1 \text{ prop } z \text{ int}) \\ (0.5063, 0.5537)\end{aligned}$$

b. It is thought that the rate of all voters in this district who will vote "Yes" is only 48%. Use your confidence interval to explain why you agree or disagree with this statement.

(2)

No, 48% is not in the interval.

c. Reexamine the question in part "b" using a hypothesis test instead of a confidence interval. Remember that the assumption is that 48% of the voters will vote "Yes" and test whether there is evidence that it is higher.

(3)

$$H_0: p = 0.48$$

$$\text{STAT TESTS} \# 5 (1 \text{ prop } z \text{ test})$$

(3)

$$H_A: p > 0.48$$

$$\begin{aligned}p_0 &= 0.48 \\ x &= 636 \\ n &= 1200\end{aligned}$$

(3)

$$\begin{aligned}\text{P value} &= 2.6331886 \times 10^{-4} \\ &= 0.00026331886 < 5\%\end{aligned}$$

Conclusion:

(2)

~~Do not~~ Reject H_0
There is evidence that it is higher than 48%.

3. A global survey asked, "I try to avoid eating fast foods." Of those 35 years or younger that were randomly sampled, 197 out of 411 agreed with the statement. Of those over the age of 35 years that were randomly sampled, 246 out of 389 agreed with the statement.

$$\text{younger } \hat{p} = \frac{197}{411} \quad X = 197 \quad n = 411$$

(3) STAT TESTS # 6 (2 prop z int)
 (-0.2211, -0.085)

$$\text{older } \hat{p} = \frac{246}{389} \quad X = 246 \quad n = 389$$

a. Find a 95% confidence interval for the difference in outcomes.

b. Use your confidence interval to explain whether you think the two age groups are different in avoiding fast food.

(2) Yes, since 0 is not in the interval.

c. Perform a hypothesis test to test for the difference in outcomes. State your null and alternative hypothesis.

(3) $H_0: p_1 - p_2 = 0$

STAT TESTS # 6 (2 prop z test)

(3) $H_A: p_1 - p_2 \neq 0$

(3) p-value = 1.3431737×10^{-5}
 $0.000013431737 < 5\%$

d. State your conclusion based on your hypothesis test.

(2) Reject H_0
 There is evidence of a difference.

4. Is there a "Home" advantage in the number of points the Orlando Solar Bears score? Below are the number of points scored by the Bears in 5 randomly selected games played at the Amway Center here in Orlando compared with 5 randomly selected away games. Assume conditions and assumptions are met.

L1	Home	3	5	2	5	3
L2	Away	3	4	4	1	3

STAT CALC
#1

Does the difference in sample means give us enough evidence to conclude that there is a difference between points scored at home and away? Use a 95% confidence interval to answer the question.

STAT TESTS # 0 (2 sample
Tint)

① $n_1 = 5$

① $n_2 = 5$

Data

① $\bar{x}_1 = 3.6$

① $\bar{x}_2 = 3$

list 1 = L1

list 2 = L2

freq 1 = 1

freq 2 = 1

① $s_1 = 1.341640786$

① $s_2 = 1.22474487$

C level = 0.95

Pooled = No

③ CI = (-1.276, 2.4761)

Conclusion:

No difference since 0 is in the interval.

②

