Out of 50 points

STA2023 Test Chapter 10, 17-19 Name Key

Deb Howard (3-16)

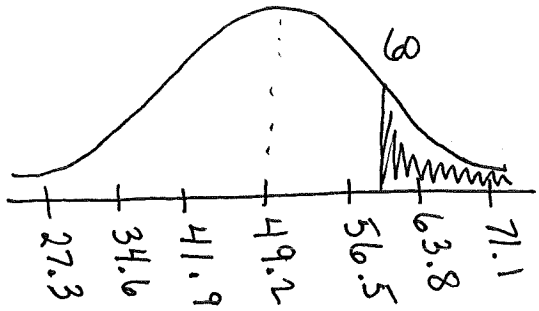
Show all work for credit including calculations when used. Note that answers using STAT TESTS #5 or #A will not receive full credit without appropriate work shown. Show all answers to 9 decimal places.

Quantitative Variable

1. According to the Weather Atlas, the average annual rainfall in Orlando, Florida is 49.2 inches with a standard deviation of 7.3 inches. Answer the following questions. $\mu = 49.2$ $\sigma = 7.3$

a. Make a sketch. What is the probability that Orlando would have more than 60 inches of rain in a year?

(5)



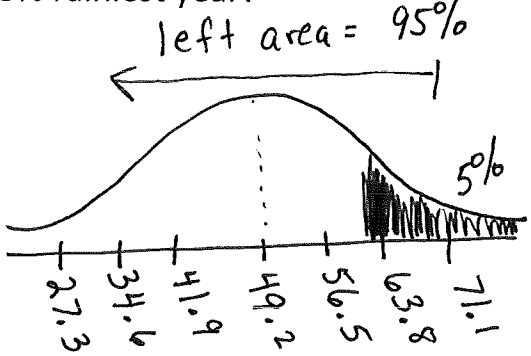
$z = \frac{\text{data} - \text{center}}{SD} = \frac{60 - 49.2}{7.3}$

$z = 1.479452055$ (A)

normalcdf (A, 100) = 0.069509813

b. Make a sketch. How much would it have to rain to be considered in the top 5% rainiest year?

(5)



(A)

$z = \text{invnorm}(0.95) = 1.644853626$ (95%)

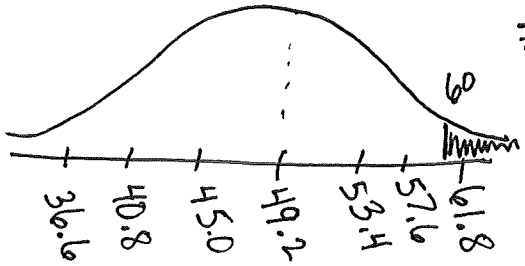
$\text{data} = z * SD + \text{center}$

$= (A) * 7.3 + 49.2$

$= 61.20743147$

c. Suppose we randomly select 3 years. Make a sketch of the sampling distribution of the rainfall for the average of these 3 years. Find the probability that the **mean** rainfall is more than 60 inches.

(5)



$n = 3$ Use CLT

$SD = \frac{\sigma}{\sqrt{n}} = \frac{7.3}{\sqrt{3}} = 4.214656965$ (A)

$z = \frac{60 - 49.2}{(A)}$

$z = 2.562486126$ (B)

normalcdf (B, 100) = 0.005196313

Categorical Variable

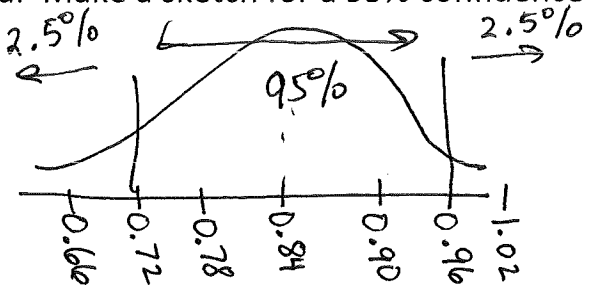
2. In a randomly selected game in 2018-2019 season, Martin Ouellette, a goalie for the Orlando Solar Bears hockey team, made 27 saves out of 32 shots on goal. Assume all conditions have been satisfied.

$\hat{P} = \frac{27}{32} = 0.84375$

$n = 32$

a. Make a sketch for a 95% confidence interval.

(2)



b. Find the indicated values for a 95% confidence interval showing all work and reporting nine decimal places.

(2) $\hat{p} = \frac{27}{32} = 0.84375$

(2) $SD = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \sqrt{\frac{0.84375(1-0.84375)}{32}} = 0.064186237 2$

(2) $z = \text{invnorm}(0.025) = \pm 1.959963986$

Confidence Interval = $\pm z * SD + \text{center}$

$\pm 1.959963986 * 0.064186237 2 + 0.84375$

(2) $(0.7179472867, 0.9695527133)$

Check by STAT TESTS #A

d. Interpret your interval in the context of the problem.

(2) We are 95% confident that the true percent of saves for shots on goal is between 71.8% and 97.0%.

e. East Coast Hockey League standings report that Ouellette's save percentage is 90.8%. Does your interval support this?

(2) Yes, 90.8% is in the interval.

Categorical Variable $p = 0.10$

3. According to CNN, 10% of all people are left-handed. You choose a random sample of 500 adults and find that 60 of them are left-handed. Use a hypothesis test to determine if there is enough evidence to support that left-handedness is higher than what CNN reports. $n = 500$ $\hat{p} = \frac{60}{500}$

a. State the conditions and whether or not each is satisfied.

(5) random ☺
independent ☺
$500 < 10\%$ of all people ☺
$500(0.10) = 50 \geq 10$ ☺
$500(1-0.10) = 45 \geq 10$ ☺

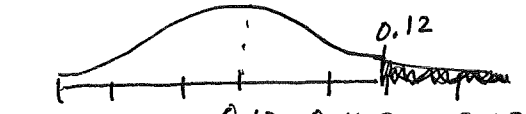
All conditions satisfied.

b. State your null and alternative hypothesis.

(3) H_0: $p = 0.10$ left handedness is 10%

(3) H_A: $p > 0.10$ left handedness is higher than 10%

c. Find the indicated values. Remember to show all work and report nine decimal places.



(2) $\hat{p} = \frac{60}{500} = 0.12$ (A)

(2) $SD = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.10(1-0.10)}{500}} = 0.013416407\,9$ (B)

(2) $z = \frac{\text{data} - \text{center}}{SD} = \frac{0.12 - 0.10}{(A)} = 1.490711985$

(2) p-value = normalcdf ((B), 100) = 0.068018594 1 > 5%

check STAT TESTS #5 $p_0 = 0.10$ $x = 60$ $n = 500$

c. State your conclusion based on your hypothesis test in the context of the problem. Do not reject H_0

(2) There is not enough evidence that left handedness is higher than 10%.