Total out of 43 points

11:30 class
$\bar{x} = 71.64$
$S_x = 19.13$

3:00 class
$\bar{x} = 74.46$
$S_x = 24.44$

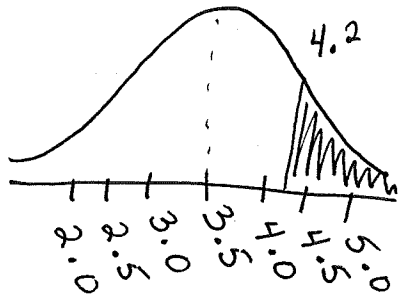
STA2023 Test Chapter 17-19 Name Key 21, 61, 73, 98, 100
Deb Howard (3-16) 43, 60, 72, 88, 99

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.

1. In recent days, Florida social media users have been sharing video and photos of the annoying insects as the bugs descend on the state in what many people are calling "the worst love bug year ever." Love bugs live on average 3.5 days with a standard deviation of 0.5 days. $\mu = 3.5$ days $\sigma = 0.5$ days

a. Make a sketch. What is the probability that a love bug would live more than 4.2 days?

(5)

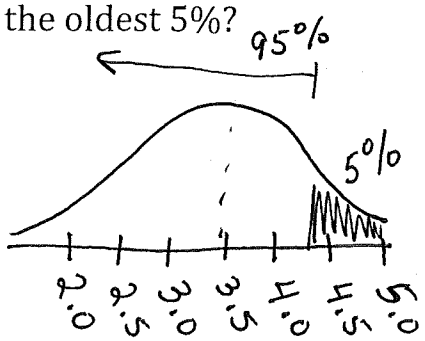


$z = \frac{\text{data} - \text{center}}{SD} = \frac{(4.2 - 3.5)}{0.5} = 1.4$

normalcdf (1.4, 100) = 0.080756712

b. Make a sketch. How long would a love bug have to live to be considered in the oldest 5%?

(5)



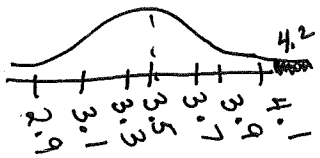
$z = \text{invnorm}(0.95) = 1.644853626$ (A)

$\text{data} = z * SD + \text{center}$
$= (A)(0.5) + 3.5$
$= 4.322426813$ days

c. Suppose we randomly select 5 love bugs. Make a sketch of the sampling distribution of the lifespan for the average of these 5 love bugs. Find the probability that the **mean** lifespan is more than 4.2 days. $n = 5$

(5)

$SD = \frac{\sigma}{\sqrt{n}} = \frac{0.5}{\sqrt{5}} = 0.2236067977$



$z = \frac{\text{data} - \text{center}}{SD} = \frac{(4.2 - 3.5)}{0.2236067977} = 3.130495168$ (A)

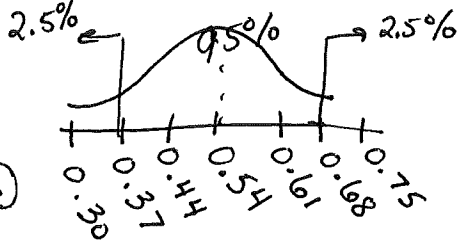
normalcdf ((A), 100) = $8.726264366 \times 10^{-4}$
= 0.000872626436

2. Some 17.4 million Americans watched the first episode of the final season of television's "Game of Thrones" - a record audience for the medieval fantasy series, cable channel HBO said on Monday. Ciara was curious about what percentage of adults watched at least one episode during the 8 seasons. She asked a random sample of 50 American adults and found that 27 had.

$n = 50$ 27 out of 50

$\hat{p} = \frac{27}{50} = 0.54$

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



(1)

$SD = \sqrt{\frac{0.54(1-0.54)}{50}} = 0.070484040 7$ → (A)

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

(2) $\hat{p} = \frac{27}{50} = \boxed{0.54}$ = center

(2) $SD = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = \sqrt{\frac{0.54(1-0.54)}{50}} = \boxed{0.070484040 7}$ → (A)

(2) $z = \text{invnorm}(0.025) = \boxed{-1.959963986}$ → (B)

(2) Confidence Interval = $\pm z * SD + \text{center} = \pm (B)(A) + 0.54$

$\boxed{(0.401853818 5,\ 0.678146181 5)}$

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

(2)

We are 95% confident that the true percentage of all adult who watched at least one episode of game of thrones is between 40.2% and 67.8%.

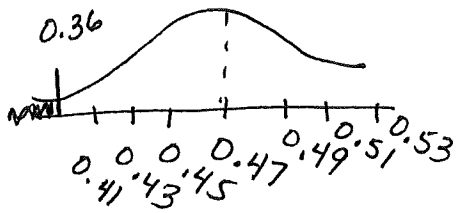
3. A CNBC article states, "By some estimates, Florida lost about 70 percent of its citrus crop due to Hurricane Irma, and production could be the lowest since around 1946". In 1946, the USDA reported that Florida citrus accounted for 47% of all citrus produced. After Hurricane Irma, that number had decreased to 36% of the 1000 sampled. Test the hypothesis that the Florida citrus production decreased from 1946 and is likely due to the effects of Hurricane Irma.

$p = 0.47$
$\hat{p} = 0.36$
$n = 1000$

a. State your null and alternative hypothesis.

(3) H_0: $p = 0.47$

(3) H_A: $p < 0.47$



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

(2) $\hat{p} =$ 0.36

(2) $SD = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.47(1-0.47)}{1000}} =$ 0.015782902 1 (A)

(2) $z = \frac{\text{data} - \text{center}}{SD} = \frac{(0.36 - 0.47)}{(A)} =$ −6.969567385 (B)

(2) p-value = normalcdf $(-100, (B)) =$ $1.6 \times 10^{-12} \approx 0$

c. State your conclusion based on your hypothesis test in the context of the problem. Reject H_0 in favor of H_A since pvalue < alphalevel of 5%.

(2) There is evidence to suggest that Florida accounts for all citrus produced is less than 47%.