6. Your friend made a statement that high school females are more physically active than high school males. To test this hypothesis you took a sample of 25 males and 25 females and found that females exercised for 3.9 hours more hours per week than the males.

1. What is your null hypothesis? Choose one of the following.
a. Females exercise more than males.
b. Females and males exercise the same amount.
c. Females exercise 3.9 hours more than males.
d. Females do not exercise more than males.

The null hypothesis was simulated 400 times and the results are shown in the graph below. How unusual are the results from our sample? Justify your response.
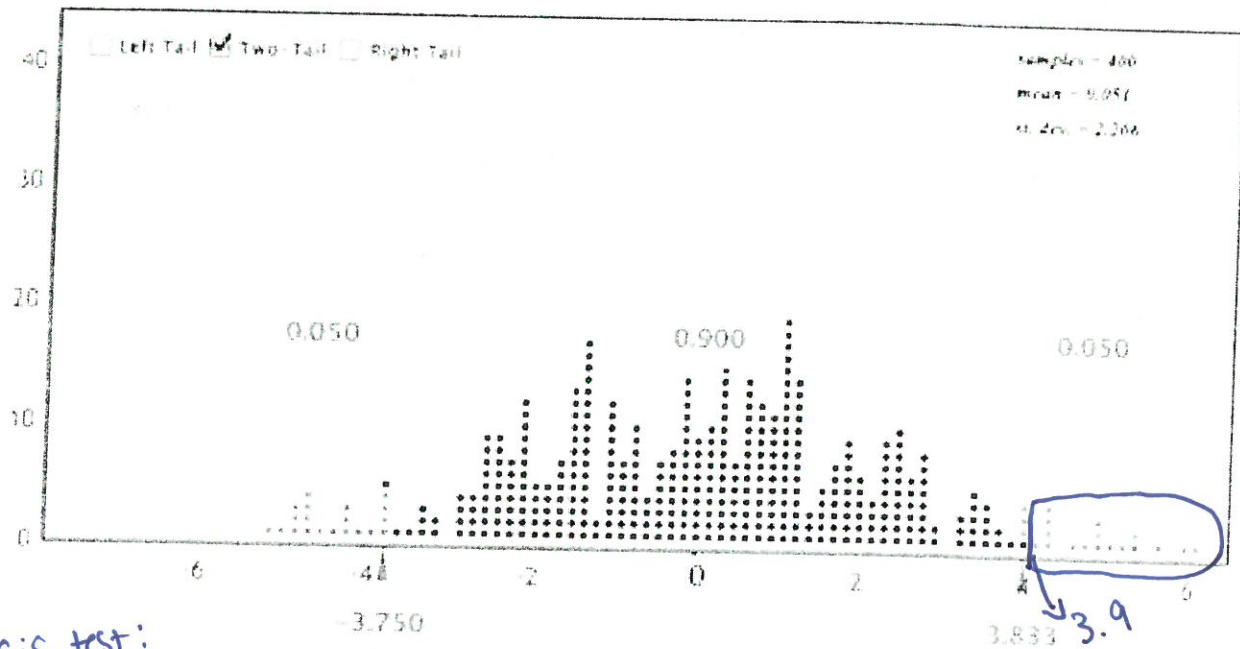
hypothesis test:

p-value = $\frac{17}{400}$ = 0.042

These results are surprising!
(If the females + males really do exercise the same amount of time, then we will get a sample difference as large as 3.9 about 4.2% of the time. This is surprising. Therefore females probably do exercise more than males.

7. The public health department selects 5000 people to participate in a research study on dexterity and flexibility. Of the 5000 people, only 2000 show up. The researchers document the number of people who can clasp their left foot with their left hand behind their backs, by reaching over their left shoulder. They conclude that an amazing 72% of people can perform this act of dexterity and flexibility.

Are these findings reliable? Why or why not?

NO, there is no statement made about how people were selected. Then probably only the people who felt they were flexible and dexterous showed up — this would be bias due to voluntary response.

3. According to US News & World Report,
http://colleges.usnews.rankingsandreviews.com/best-colleges/search?name=umcp&state, the
acceptance rate at the University of Maryland College Park was 46.91% in 2013. You have
taken an SRS of 50 high school seniors who applied to UMCP in 2014 and found that 21 were
accepted.

$$\hat{p} = \frac{21}{50} = .42$$

a. Write the null and alternate hypotheses for this problem situation.

$$H_0 : p = .4691$$

$$H_A : p < .4691$$

b. Design a simulation for a hypothesis test that could be used to determine if the true proportion
has decreased.

We can use Lock5Stat to simulate 1000 samples of
50 students. We will use .4691 as our null hypothesis
and we will determine how likely it is to have a sample
proportion as low as .42 by finding the p-value

4. A vitamin company claims that people who take their vitamins daily get sick less often. If
you wanted to test this claim, what is your null hypothesis? Choose one of the following.

a. Taking the vitamins prevents illness.
b. People who do not take the vitamins will not get sick.
c. People who do not take the vitamins are 10% more likely to get sick.
d. People who do and do not take the vitamins get sick at the same rate.

5. A business manager decided to evaluate whether or not he sells more product when he
advertises than when he doesn't in order to cut back on any unnecessary costs. He decided to
conduct a study concerning revenue with and without advertisement. What would be the null
hypothesis in this study?

a. There is a significant difference between revenues with and without advertisement
b. There is no significant difference between revenues with and without advertisement
c. The advertisements are not necessary for revenues
d. The advertisements are necessary for revenues
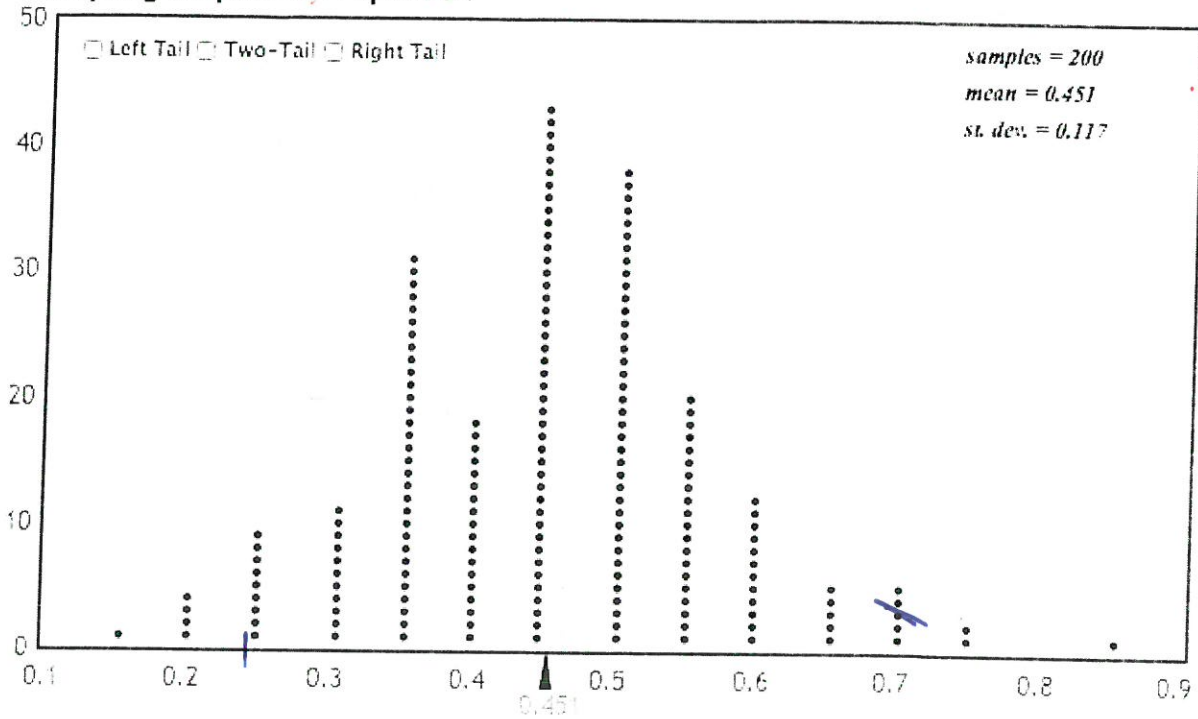
2. Instagram assumes that 75% of teens use their app. We have taken an SRS of 20 teens and found that 9 of them use an Instagram. In order to see if this is unusual, we took 200 samples of size 20 and found $H_0: p = .75$ $\hat{p} = \frac{9}{20} = .45$

Sampling Dotplot of Proportion

□ Left Tail □ Two-Tail □ Right Tail

samples = 200
mean = 0.451
st. dev. = 0.117

a. Construct a 95% confidence interval for the percentage of teens using Instagram.

95% of 200 = 190   (.25, .7)

5 samples in each tail

We are 95% confident that the true proportion of teens using Instagram
            is between .25 and .70

b. Based on your confidence interval, is there evidence that Instagram's assumption is incorrect? Why or why not?

Yes since our null hypothesis of p=.75 is not

contained in our 95% confidence interval, we

have strong evidence against the null. We

can say that 75% of teens are not

using Instagram.

1. We surveyed 500 amateur hockey teams across the United States to find out how many points the score each season. The dot plot shows each response.
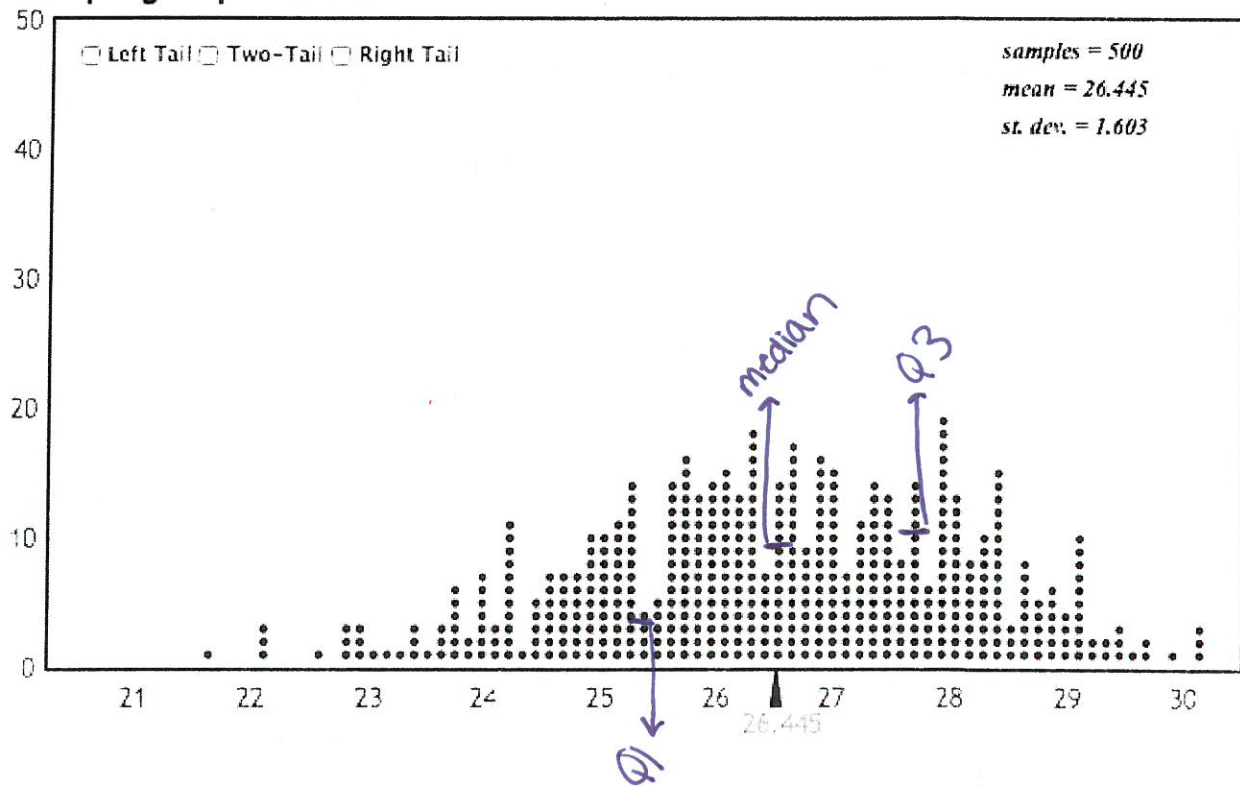
a. Describe the shape of the data.

The pts scored by amateur hockey teams across the US is skewed left

b. Where is the center of the data?

The Median is approximately 26.5 pts

c. Describe the spread of the distribution.

The IQR is approximately 2.2 pts

Q1 ≈ 25.5 pts

Q3 ≈ 27.7