PROBLEM SET 1

For the first three answer true or false and explain your answer. A picture is often helpful.

1. TRUE OR FALSE: Suppose the significance level of a hypothesis test is $\alpha=0.05$. If the p-value of the test statistic is p-value = 0.07, then the null hypothesis (H_0) should be rejected.

2. TRUE OR FALSE: If we fail to reject the null hypothesis (H_0) that means that the test statistics was not in the rejection region.

3. TRUE OR FALSE: If we fail to reject the null hypothesis (H_0) at a significance level of $\alpha=0.05$, then we also must fail to reject it at a significance level of $\alpha=0.10$.

4. Suppose that we do reject the null hypothesis at a significance level of $\alpha=0.05$, but we **do not** reject the null hypothesis at a significance level of $\alpha=0.01$. What can you say about the p-value of the test statistic?

5. Suppose we claim that the Candidate A will win the election against Candidate B. We take a sample and construct a confidence interval for p, the proportion of voters who will vote for Candidate A. The confidence interval is (0.489, 0.532). Does this confidence interval support the claim that Candidate A will win? Explain.

PROBLEM SET 2

1. A multiple choice test has 5 answers per question (a,b,c,d,e). Suppose you randomly guess on each question. If you get the question correct, you get 5 points, if you get the question wrong, you lose 2 points. If there are 3 questions, what is your expected point total for the test?

2. Two cards are dealt at random from a standard 52 card deck without replacement.
   a. What is the probability that the first is a Jack and the second is a 3?

   b. What is the probability that the first is a face card and the second card is a club?

3. I was not paying attention to where I was walking and I stepped on a large bag of tortilla chips. The probability that any given chip in the bag was broken is p=0.25. Suppose I reach in and grab 10 chips. Let X be the number of cracked chips.
   a. Explain why X is binomial. What is n? p?

   b. What is the probability that at most 3 of my chips are broken? (Don't use the table unless the exact value of p is in the table.)

   c. What is the probability that at least 4 of my chips are broken? (Hint: How can you use your answer to the last problem?)

PROBLEM SET 3

A disgruntled customer complained to a candy bar company that although the label weight of the candy bar was 58.7 grams, it actually weighed less. The company claims that the weights of the candy bars follow a normal distribution with mean $\mu = 58.7$ grams and standard deviation $\sigma=0.5$ grams.

1. Assuming the company's claim is true, what is the probability that a given candy bar will weigh less than 58 grams?

2. The customer bought 20 candy bars. Find the probability that the average weight, $\bar{x}$, was less than 58.5 grams.

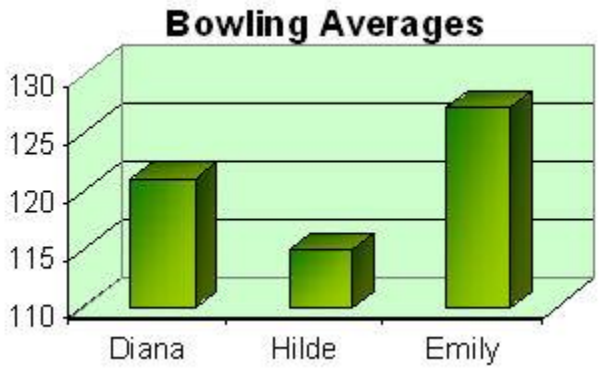
3. Suppose that the customer's 20 candy bars had an average weight of $\bar{x} = 58.5$ grams. Do a hypothesis test to determine if his claim that the average is less than 58.7 grams is valid. State the null and alternate hypothesis. Use a significance level of $\alpha=0.05$ and clearly state your conclusion.
   H_0: H_1:

4. Again suppose that the customer's 20 candy bars had an average weight of $\bar{x} = 58.5$. Find a 90% percent confidence interval for the true mean, μ, of the candy bars. Assume $\sigma=0.5$ grams.

5. Explain clearly why your confidence interval in 4 supports the result you got in 3.

PROBLEM SET 4

1. Why is this graph misleading?



2. Some students are comparing their scores on an exam when their friend walks in with a lower score than the min, in this case the RANGE:

a. Decreases b. Increases c. Stays the Same d. None of the Above

3. The test score distribution for a class of about 50 students is approximately normal. The teacher finds four papers that she misplaced that skew the data more to the left. This means the four scores, compared to the rest of the class :

a. Are much higher than the mean b. Are much lower than the mean c. Are about the same as the mean d. None of the Above

4. The test score distribution for a class of about 50 students is approximately normal. The teacher finds four papers that she misplaced decrease the mean test score. This means the average of the four scores, compared to the rest of the class:

a. Are higher than the mean b. Are lower than the mean c. Are about the same as the mean

5. The test score distribution for a class of about 50 students is approximately normal. The teacher finds four papers that she misplaced increase the median test score. This means the four scores, compared to the rest of the class:

a. Are higher than the median b. Are lower than the median c. Are about the same as the median

6. Suppose you go to Fry's Electronics to buy a CD. If the CD is marked down 20% to $11.20, what was the original price of the CD?

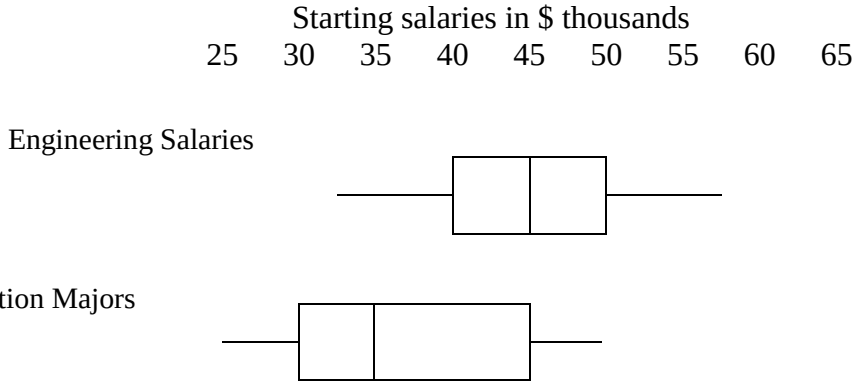
   a. $8.96 b. $11.40 c. $14.00 d. $12.44

7. If the CD you bought at Fry's (from Question 3) is then marked back up to its original price from its discounted price of $11.20, what was the percentage increase from the discounted price to the original price. (Remember the CD was originally marked down 20%.)

   a. 20% b. 25% c. 28% d. 30% e. 33 1/3 %

This information is for the next three problems

Use the box-and-whisker plots to compare the starting salaries for first year graduates in education and engineering.



8. If there were 504 engineering majors; how many of them had a starting salary $50,000 or more?

   a. 378 b. 252 c. 126 d. Can't be determined

9. If there were 1200 education majors; what percent of them made $30,000 or less?

   a. 25 b. 300 c. 75 d. Can't be determined

10. Why is one part of the box in the plot for education salaries longer than the other part?

    a. There is more data between the upper part than the lower part.

    b. The data in the lower part is spread out more.

    c. There is less data between the upper part than the lower part.

    d. The data in the upper part is more spread out.