Suggested Answers for WarmUps for Lesson 20	
1.	On page 207 in your work book you will find a flow chart that sets up a series of questions the answers to which will guide you to the correct choice of Z or Student's t scores for problems. Follow the flow chart using this path: **What is your random variable? ==>X-bar ==>Is the population normally distributed? ==>No:** What is the next question you should ask yourself along this path? That is, what question will follow No: in the path you have followed?
Answer	Is the sample size at least 30?
2.	On page 207 in your work book you will find a flow chart that sets up a series of questions the answers to which will guide you to the correct choice of Z or Student's t scores for problems. Follow the flow chart using this path: **What is your random variable? ==>X-bar ==>Is the population normally distributed? ==>Yes:** What is the next question you should ask yourself along this path? That is, what question will follow Yes: in the path you have followed?
Answer	Do I know σ?
3.	How would a hypothesis test be affected if the null hypothesis **did not** contain the equals sign? Use an example to help.
Answer	Consider this scenario. If the belief is that people are getting taller, a test of mean height might be made. Suppose the assumption in the null is that the population mean is less than 67 inches. If the null does not contain the equals sign, the following would be the set of hypotheses for this circumstance. H_0: $\mu < 67$ " H_1: $\mu \geq 67$" Suppose that a sample mean was calculated that was equal to 67". Applying that to the hypotheses would lead to a rejection of the null and a conclusion that the population mean was 67 or more inches, which fails to inform the situation. In other words, the test indicated that the mean was not less than 67 inches, but we cannot conclude that it is more than 67 inches. Even if the sample mean were greater than 67, it would not be possible to conclude that the mean height is greater than 67 inches.
4.	Why do we say "Fail to reject the null" instead of "Accept the null" when drawing a conclusion in a hypothesis test? I am not asking about the circumstances in which one would do this, I am asking about the language.
Answer	We use this language because we can never be certain the null is true when our evidence is a random sample. The uncertainty that arises from sampling error (the difference between the sample mean and the population mean) cannot be eliminated. It would require population information to conclude that a null is true.
5.	What role do critical values play in a hypothesis test?
Answer	Critical values are boundary lines, lines that separate specific, distinct areas. While critical values always are part of the non-rejection region, they signal the absolute end of the region; anything greater or smaller belongs to a different region.
6.	On page 374 of your text there is a discussion of confidence intervals compared to hypothesis tests. This is sometimes referred to as the "confidence interval analogy" to a two-tailed hypothesis test. There are specific similarities and differences between confidence intervals and two-tailed hypothesis tests. What are they? I am

	not looking for philosophical differences here, but technical ones. For example, remember the activity we did in class where we listed the parts that were common to all confidence interval formulas? Following this example will answer half of this question. You will then need to list differences.
Answer	Similarities: Alpha is divided in half in both; the non-rejection region and the confidence interval are analogous; there are two critical values in each. Differences: the hypothesized null value is at the center of the hypothesis test, while the sample statistic is at the center of a confidence interval.
7.	What things will you consider when you write the hypotheses for a test? Specifically, I want to know what information you will look for to help you get the correct set of hypotheses. Be very specific.
Answer	Information necessary for hypotheses includes the name of the parameter being tested, the assumed value of the parameter and any indication that a particular subset of possible values of the parameter is of more interest than all possible values. It is important to know if you are testing a population mean or a proportion, so any clues or key words that indicate that are important, such as “the average” or being told the evidence is a sample mean indicate that the parameter is a population mean. In real life, you will not have any possibly confusing sample information when writing hypotheses, because they will be written long before you take a sample. However, in “problems” in this class, you will likely have both statistic AND parameter values. You need to refer to your list of clues that indicate if you have a parameter or a statistic. It is important to know if the test to be performed is a right (one) tailed, a left (one) tailed test, or a two tailed test. Thus, any information suggesting or implying a direction of interest (this does NOT include any statistic given in the problem and its relationship to the hypothesized parameter) is very important. Likewise, the lack of any such information is also important. Phrases such as “at least”, “no more than” or “different from” indicate direction.
8.	A manufacturer of salad dressings uses machines to dispense liquid ingredients into bottles that move along a filling line. The machine that dispenses dressing is working properly when 8 ounces are dispensed. Suppose that the mean amount dispensed in a particular sample of 48 bottles is 7.983 ounces. Set up the null and alternative hypotheses to test the filling process.
Answer	H_0: $\mu = 8$ oz H_1: $\mu \neq 8$ oz