(9 points : 10 minutes)

1. **To compare the quality of cakes cooked in a microwave oven to cakes cooked in a conventional oven, developers prepared seven cake recipes. Half of each recipe was cooked in a microwave oven and the other half of each recipe was cooked in a conventional oven. The quality of the cakes was judged by an expert panel and scored from 0 to 10. Treat the data below as quantitative and use them to make a 90% confidence interval for the difference in quality between microwave and conventional ovens.**

Quality of Cakes			
	Oven		Diff.
Recip	Microwave	Conventional	C - M
1	5	9	4
2	6	9	3
3	6	9	3
4	8	6	-2
5	8	10	2
6	8	10	2
7	5	7	2

Claim: ______________________

H_0: ______________________

H_1: ______________________

(9 points : 10 minutes)

2. **Use the data from the cake study in problem #1 to test the claim that conventional ovens are better than microwave ovens for cooking cakes, so the quality of cakes from conventional ovens is more than 1/2 point better on average than the quality of cakes from microwave ovens.** Use a 5% significance level for your test.)

Claim: ______________________

H_0: ______________________

H_1: ______________________

(8 points; 7 minutes)

3. **Use the summary statistics for a random selection of Saturdays in September at Folsom Lake to test whether the mean number of boats on the lake decreases by more than 100 boats when the temperature is less than 70^{o}F compared to the number of boats when the temperature is greater than 90^{o}F. Use a 0.025 significance level for your test. Variability in the number of boats is greater during cold weather than during hot heather.**

Sample Statistic	Temp. < 70	Temp. > 90
days =	12	18
$\bar{x}$ =	217	336
s =	68	45

(8 points : 10 minutes)

5. Use the data on people's experience using two medications to help reduce the duration of a cold. Test the claim that the proportion of people who still have a cold after 4 days is smaller with Medication A than with medication B. (Use a Type 1 error rate of 5% for this test.)

4-day Condition	Medication A	Medication B
No cold	27	22
Still Sick	63	88
Total	90	110

Claim: ____________________

H_0: ____________________

H_1: ____________________

(7 points : 8 minutes)

6. Use the data from problem #5 to make a 95% confidence interval for (p_B - p_A), the difference between the proportions of people still having a cold after 4 days of taking medication B and medication A. Then, use your confidence interval to answer the question at the end of this problem.

Based on your confidence interval, is it reasonable to say that $p_B < p_A$? Circle answer and explain.

YES **Why?** ____________________

NO ____________________

____

(8 points; 9 minutes)

7. Based on the statistics shown below, test the claim that the percentage of 15 year old girls that have a personal cell phone is greater than the percentage of 15 year old boys that have a personal cell phone. (For the test, use a Type 1 error rate of 0.05.)

Sample Statistics

Personal Cell Phone	15 Year Old Girls	15 Year Old Boys
Yes	90	57
No	45	35

H_0: ____________________

H_1: ____________________

(8 points : 9 minutes)

9. **When the economy declines, more people have to ride public transit to work (I suppose). Thirty-eight people were selected in a study of the transit time from meadowview to downtown. Use the data given here to test the claim that the time needed to ride light rail downtown from the Meadowview area is less than 10 minutes more than the time needed to drive downtown from the Meadowview area. Variability in travel minutes is not the same for driving and for taking light rail.** (Use a 5% significance level for this test.)

Sample Results for Travel Minutes needed from Meadowview to Downtown

	Driving	Light Rail
$\overline{X}$ =	28.2	40.3
S =	4.6	6.3
N =	16	22

Claim: ______________________

H_0: ______________________

H_1: ______________________

(8 points : 8 minutes)

10. **When the economy declines, more people have to ride public transit to work (I suppose). Thirty-eight people were selected in a study of the transit time from meadowview to downtown. Use the data given here to construct a 95% confidence interval for the difference in travel time needed to go from the Meadowview area to Downtown. Assume for this analysis that variation in travel times is the same for both modes of transportation.**

Sample Results for Travel Minutes needed from Meadowview to Downtown

	Driving	Light Rail
$\overline{X}$ =	28.2	40.3
S =	4.6	6.3
N =	16	22

(7 points; 7 minutes)

9. **In a recent poll of Americans, 723 had private health insurance and 288 did not. Use the results below to make a 98% confidence interval for the difference between the proportions of these two groups with respect to their approval of President Obama's Health Care policies.**

Have Private Health Insurance	Approve of President's Health Care Policies		
	Yes	No	Total
Yes	209	514	723
No	165	123	288
Total	374	637	1011

(10 points; 10 minutes)

1. Compare the amount of energy per kilogram of two "biomass fuels" by testing the possibility that the average energy for Fuel A is more than 5 more than the average energy for Fuel B. The fuels are from very different sources, so it is likely that the variability of energy content from sample to sample is not the same. (Use a = 0.05 for this hypothesis test.)

Sample	Fuel A	Fuel B
1	90	88
2	79	72
3	87	66
4	86	74
5	73	
$\overline{X}$ =		
s =		
n =		

H_0: ____________________

H_1: ____________________

(9 points; 10 minutes)

5. Use the data below to prepare a 98% confidence interval for the difference between the proportion of college graduates that own a home and the proportion of those who have not graduated from college that own a home. The data come from random samples of 500 from each group.

College Degree	Own a Home: Yes	Own a Home: No
Yes	313	187
No	218	282

Based on your confidence interval, is it reasonable for someone to claim that the proportion of college graduates that own a home is 60% but the proportion of non-graduates is 45% ?

YES **NO** **Why?** ____________________

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