Elementary Statistics
Week 08 – Part 2 of the Final Exam

Each question is worth 13.75 points.

For the test of significance questions, clearly indicate each of the formal steps in the test of significance.
Step 1: State the null and alternative hypothesis.
Step 2: Calculate the test statistic.
Step 3: Find the p-value.
Step 4: State your conclusion. (Do not just say "Reject H_0" or "Do not reject H_0", state the conclusion in the context of the problem.)

On your written assignment copy and paste the following statement. Please state that you agree with the following academic honesty statement.

I pledge that all of the following work is my own and I am following the rules of conduct consistent with Norwich University's Academic Honesty Policy stated in the Student's Academic Regulations.

I have not and will not receive help from any outside source on this final exam. I have not and will not use any resources such as classroom notes, previous quizzes, or any other course material, other than a calculator, the hypothesis testing flow chart provided, the normal table, and Minitab Express.

I will not aid any other student on this exam. I am aware that it is a violation of academic honesty to share or receive any information about the exam with any other student.

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1. A market research group is interested in comparing the mean weight loss for two different popular diets. The researcher chooses two random samples of participants for the two diet programs. For Diet A, the mean weekly weight loss for 10 participants was 1.5 pounds with standard deviation 0.4 pounds. For Diet B, the mean weekly weight loss for 12 participants was 1.2 pounds with standard deviation 0.6 pounds. At a 5% significance level, does this indicate that Diet A is better than Diet B?

2. Random samples of 50 women and 50 men are taken at Norwich University. They are asked their reaction to increased tuition fees. Of the women, 23 favored the increase. Of the men, 19 favor the increase. At a 10% significance level, does this indicate that a larger proportion of women favor the increase than men?

3. A method currently used by doctors to screen patients for a certain type of cancer fails to detect cancer in 15% of the patients who actually have the disease. A new method has been developed that researchers hope will be able to detect cancer more accurately. A random sample of 80 patients known to this type of cancer is screened using the new method and the method failed to detect the cancer in 8 patients. At the 5% level of significance, can the researchers conclude that the new method is better than the one currently in use? (Can they conclude that the new method fails to detect cancer in less than 15% of the patients who actually have the disease?)

4. **Beetles in oats.** In a study of leaf beetle damage on oats, researchers measured the number of beetle larvae per stem in small plots of oats after randomly applying one of two treatments: no pesticide or malathion at the rate of 0.25 pound per acre. Below are the summary statistics. Compute a 95% confidence interval for the difference in the mean number of beetle larvae per stem for the no pesticide group and malathion group.

Group	Treatment	Mean	St. Dev	n
1	no pesticide	3.47	1.21	13
2	malathion	1.36	0.52	14

5. A coffee shop claims that its fresh-brewed drinks have a mean caffeine content of 80 milligrams per 5 ounces. A city health agency believes that the coffee shop's fresh- brewed drinks have higher caffeine content. To test this claim the health agency takes a random sample of 100 five-ounce servings and found the average mean caffeine content of the sample was 87 milligrams with standard deviation of 25 milligrams. Does this provide enough evidence at the 1% significance level to claim that the coffee shop's fresh- brewed drinks have higher caffeine content? *(Adapted from Reader's Digest Eating for Good Health.)*

6. In a recent survey of county high school students, 100 males and 100 females, 66 of the male students and 47 of the female students sampled admitted that they consumed alcohol on a regular basis. Find a 90% confidence interval for the difference between the proportion of male and female students that consume alcohol on a regular basis. Can you draw any conclusions from the confidence interval?

7. Does using premium gas increase your miles per gallon? A study was conducted with nine vehicles that can run on regular gas to see if using premium gas will get better gas mileage. Each car in our sample was randomly filled first with either regular or premium gasoline, and the mileage for that tankful recorded. The mileage was recorded again for the same cars for a tankful of the other kind of gasoline. Is there evidence to suggest that using premium gas will increase your miles per gallon? (Use 10% significance level.)

	Gas Mileage (mpg)		Difference
	Premium	Regular	
Vehicle 1	19	20	-1
Vehicle 2	35	32	3
Vehicle 3	34	33	1
Vehicle 4	18	19	-1
Vehicle 5	40	37	3
Vehicle 6	26	27	-1
Vehicle 7	36	33	3
Vehicle 8	28	29	-1
Vehicle 9	34	31	3
Mean	30	29	1
St Dev	7.7	6.1	2.0

8. Suppose the mean salary for full professors in the United States is believed to be $71,650. A sample of 15 full professors revealed a mean salary of $74,250 with a standard deviation of $5,000. Can it be concluded that the average salary has increased using a 1% level of significance?