INTRODUCTORY STATISTICS TEST NUMBER 6

Question 1: (15 points

A two-tailed test is used to evaluate H_0: $\mu_x = \mu_y$.

	X	Y
Sample size (n)	3	5
Mean	7.0	3.0
Variance	1.0	2.5

Find the lowest value of α at which the researcher will reject the null hypothesis. What assumptions did the researcher have to make about the populations to do this test?

Question 2: (15 points)

It is known that about 7% of all persons are left-handed. The question arises as to whether left-handedness is more prevalent among men than women. A researcher wishes to use independent random samples to measure the difference between the proportions of men and women that are left-handed. She wants a 90 percent confidence interval for this difference to be accurate within ± 0.01. How many persons should be included in the sample?

Question 3: (25 points)

Some college professors make bound lecture notes available to students in an effort to improve teaching effectiveness. Two groups of students were surveyed—86 students enrolled in an eco100 class that required the purchase of the lecture notes and 60 students in an eco100 class that did not offer lecture notes. In both classes the instructors used lectures as the main method of delivery. At the end of the semester students were asked to respond to the statement "Having a copy of the lecture notes was [would be] helpful in understanding the material." Responses were measured on a 9 point scale where 1 = "strongly disagree" and 9 = "strongly agree". The results can be summarized as follows:

Students Buying Notes	Students Not Buying Notes
$n_1 = 86$	$n_2 = 60$
$\bar{X}_1 = 8.48$	$\bar{X}_2 = 7.80$
$s_1^2 = 0.94$	$s_2^2 = 2.99$

a) Describe the populations involved in the comparison

b) Do the samples provide sufficient evidence to conclude that there is a difference in the mean responses of the two groups of students? Test using $\alpha = .01$.

c) Construct and interpret a 99% confidence interval for the difference in the population means.

d) Would a 95% confidence interval for the difference in the population means be wider or narrower than the one you found in part c)? Why?

Question 4: (25 points)

In a tasting session, a random sample of 100 subjects from a target consumer population tasted a food item, and each subject individually gave it a rating from 1 (very poor) to 10 (very good). It is desired to test H_0: $\mu \leq 6.0$ vs. H_1: $\mu > 6.0$, where μ denotes the mean rating for the food item in the target population. A computer analysis of the sample results showed that the one-sided P-value of the test is .0068.

a) Does the sample mean lie above or below $\mu_0 = 6.0$?

b) What must be the value of value of z generated by the sample?

c) The sample standard deviation is $s = 2.16$. What must be the sample mean $\bar{X}$?

d) Does the magnitude of the P-value indicate that the sample results are inconsistent with conclusion H_0? Explain.

Question 5: (20 points)

In the first term test in Economics 100 (enrollment = 275) the average mark was 32 out of a total of 50 points, with standard deviation of 8 points. In the second test the average mark was 36 points out of a possible 50 points with standard deviation equal to 6.0. The term marks, taken as a sum of the two term tests, averaged 68 points out of a possible 100. The standard deviation of the term marks for the class was 12 points.

a) Determine the values for the covariance and the correlation between students marks on the first test $(X_{1i}, i = 1, 2, \ldots, 275)$ and their marks on the second test $(X_{2i}, i = 1, 2, \ldots, 275)$.

b) Calculate the mean and standard deviation of the paired difference in the marks between the first and second term tests.

c) Conduct a test of whether students performed better on the first test than on the second.