Test No. 4
ENGR 115
(SHOW YOUR WORK)

Name:

1. Research at the University of Toledo indicates that 50 percent of the students change their major area of study after their first year in a program. A random sample of 120 students in the college of science revealed 54 had changed their major area of study after their first year of program. Has there been a significant decrease in the proportion of students who change their major after the first year in college? Test at the 0.10 level of significance.
   A State H_0 and H_a (5 pts)
   B Test the hypothesis using the **P-Value** approach and express your decision. (10 pts)
   C Based on the given data, determine the extreme value without rejecting the H_0. (5 pts)

2. The management of ABC Industries is considering a new method of assembling its golf cart. The present method requires 42.3 minutes, on the average, to assemble a cart. The mean assembly time for a random sample of 24 carts, using the new method, was 40.6 minutes, and the standard deviation of the sample was 2.7 minutes. Can we conclude that the assembly time using the new method is faster?

   A) State H_0 and H_a (5 pts)
   B) Test the hypothesis using the **P-Value approach** at a significance level of 1%, and express your decision. (15 pts)

3. A manufacturer of nickel-hydrogen batteries randomly selects 100 nickel plates for test cells, cycles them a specified number of times, and determines that 14 of the plates have blistered. Does this provide compelling evidence for concluding that more than 10% of plates blister under such circumstances?

   A) State H_0 and H_a (5 pts)
   B) Test the hypothesis using the **P-Value approach** at a significance level of 5%, and express your decision. (10 pts)
   C) Based on the given data, determine the extreme value without rejecting the H_0. (5 pts)

4. The desired percentage of Silicon Dioxide (SiO_2) in a certain type of aluminous cement is 5.5. To test whether the true average percentage is 5.5 for a particular production facility, 17 independently obtained samples are analyzed and a sample mean of 5.32 was obtained. Suppose that the percentage of SiO_2 in a sample is normally distributed with a sigma of 0.3. Does this show conclusively that the true average is smaller than 5.5?

   A) State H_0 and H_a (5 pts)
   B) Test the hypothesis using the **P-Value approach** at a significance level of 4%, and express your decision. (10 pts)
   C) Determine the extreme value without rejecting the H_0. (5 pts)

5. The accompanying data on x = current density (mA/cm^2) and y = rate of deposition (μm/min) appeared in a recent study.

x	20	40	60	80
y	.24	1.20	1.71	2.22

A) Do you agree with the claim by the article's author that "a linear relationship was obtained from the tin-lead rate of deposition as a function of current density"? Note: Scatter plot is not required and you must calculate the coefficient of correlation. (10 pts)

B) Determine the linear regression equation. (10 pts)