

Name: \_\_\_\_\_

Directions: This exam contains nine problems worth a total of 120 points. For each computational problem, you must first write the formula to be used and present all your subsequent work in order to receive full or partial credit. Circle your final answers.

1. Gas prices were obtained from randomly selected 43 gas stations in the midwest. The mean price was \$1.91 with a standard deviation of \$0.07.

- (a) Construct a 90% confidence interval for the true mean price in the midwest. (8 pts.)

- (b) In order for the estimate of the mean price to within \$0.015 of the true value with 95% certainty, how many observations are needed? (8 pts.)

2. Featured below are homework scores, out of 25 points, for a sample of six students.

$$X: \{17, 21, 14, 23, 20, 11\}$$

Compute the sample mean and the sample standard deviation. Show your work. (10 pts.)

3. A nonprofit research organization investigated people's perceptions about the current economic crisis. One of the questions that the organization asked was "Do you believe that the current recession will end within the next two years?" To that question, 131 of the 458 respondents stated "yes." At the significance level of .10, conduct test to determine whether the proportion of the people who believe that the recession will end within the next two years is higher than .25. (10 pts.)

$H_0$ : \_\_\_\_\_ vs.  $H_a$ : \_\_\_\_\_

Compute the test statistic and the  $p$ -value.

Should the null hypothesis be rejected? Circle one.      Yes      No

4. On a long stretch of road, there are seven traffic lights. When you approach each traffic light, there is a 60% chance that the light is red. Suppose that you drive through this road and count how many times you must stop at red lights. Assume that the traffic lights operate independently.

(a) Find the expected number of times you must stop. (8 pts.)

(b) Find the probability that you must stop exactly three times. (8 pts.)

(c) Find the probability that you must stop more than five times. (8 pts.)



7. A local law enforcement center discovered that 13% of the drivers arrested for DUI had history of previous license revocation. If you randomly select four drivers arrested for DUI, what is the probability that at least one of them will have history of previous license revocation? Hint: Use complement. (8 pts.)

8. The table below shows cross-classification of 165 people according to whether they are blue-collar workers or white collar workers and whether they plan to stay with their current jobs or plan to change their jobs in near future.

Worker type	Future plan	
	Stay	Change
Blue-collar	75	24
White collar	43	23

With an alpha level of .01, conduct a test to determine whether worker type and future plan are independent. (10 pts.)

$H_0$ :

$H_a$ :

Compute the test statistic and approximate the  $p$ -value.

Should the null hypothesis be rejected? Circle one.      Yes      No

9. Much psychological research suggested that people tended to do better on a math exam in the morning than in the afternoon. To confirm this finding, a total of 23 students were randomly divided into two groups. The first group took a math test in the morning and the second group took it in the afternoon. The obtained scores were analyzed using SPSS. The results of the analysis are shown below.

Group Statistics					
Time	N	Mean	Std. Deviation	Std. Error Mean	
Score Morning	12	75.00	8.666	2.502	
Afternoon	11	60.73	20.030	6.039	

  

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Score	Equal variances assumed	5.484	.029	2.253	21	.035	14.273	6.336	1.096	27.449
	Equal variances not assumed			2.183	13.368	.047	14.273	6.537	.190	28.356

For this analysis, provide a summary of the results. If necessary, use a significance level of .05. (8 pts.)

- State the null and alternative hypotheses.
- Report the test statistic.
- Report the  $p$ -value of the test.
- State the decision (reject or retain  $H_0$ ).
- Interpret the results in the context of the problem.