

Math 281 Introduction to Statistics

Sample Exam 3

Name _____

Sections: 9.2, 9.3, 9.4, 10.2, 10.3, 11.2

Questions 1 - 9 are multiple choice.

Questions 10 - 13 are short answer (solve problem). You must show your work. Answers alone are not considered to be a complete solution. All work must be shown in an organized logical format. Clearly identify your final answers.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Construct the indicated confidence interval for the difference between the two population means. Assume that the two samples are independent and that they have been randomly selected.

- 1) Two types of flares are tested for their burning times (in minutes) and sample results are given below.

Brand X	Brand Y
$n = 35$	$n = 40$
$\bar{x} = 19.4$	$\bar{x} = 15.1$
$s = 1.4$	$s = 0.8$

Construct a 95% confidence interval for the differences $\mu_X - \mu_Y$ based on the sample data.

- A) $3.8 < \mu_X - \mu_Y < 4.8$ B) $3.5 < \mu_X - \mu_Y < 5.1$ C) $3.2 < \mu_X - \mu_Y < 5.4$ D) $3.6 < \mu_X - \mu_Y < 5.0$

Construct the indicated confidence interval for the difference between population proportions $p_1 - p_2$. Assume that the samples are independent and that they have been randomly selected.

- 2) In a random sample of 500 people aged 20–24, 22% were smokers. In a random sample of 450 people aged 25–29, 14% were smokers. Construct a 95% confidence interval for the difference between the population proportions $p_1 - p_2$.

- A) $0.048 < p_1 - p_2 < 0.112$ B) $0.032 < p_1 - p_2 < 0.128$
C) $0.025 < p_1 - p_2 < 0.135$ D) $0.035 < p_1 - p_2 < 0.125$

Answer the question.

- 3) A random sampling of sixty pitchers from the National League and fifty-two pitchers from the American League showed that 10 National and 7 American League pitchers had E.R.A's below 3.5. Compute the test statistic used to test the null hypothesis that $p_1 = p_2$.

A) 0.61 B) 0.47 C) 88.4 D) 7.70

- 4) A hypothesis test is to be performed to test the equality of two population means. The sample sizes are large and the samples are independent. A 95% confidence interval for the difference between the population means is (1.4, 8.7). If the hypothesis test is based on the same samples, which of the following do you know for sure:

A: The hypothesis $\mu_1 = \mu_2$ would be rejected at the 5% level of significance.
B: The hypothesis $\mu_1 = \mu_2$ would be rejected at the 10% level of significance.
C: The hypothesis $\mu_1 = \mu_2$ would be rejected at the 1% level of significance.

A) A only B) A and B C) A, B, and C D) A and C

- 5) The paired data below consist of the costs of advertising (in thousands of dollars) and the number of products sold (in thousands):

Cost	9	2	3	4	2	5	9	10
Number	85	52	55	68	67	86	83	73

Find the value of the linear correlation coefficient r .

A) 0.25 B) 0.23 C) -0.07 D) 0.71

- 6) Managers rate employees according to job performance and attitude. The results for several randomly selected employees are given below.

Performance	59	63	65	69	58	77	76	69	70	64
Attitude	72	67	78	82	75	87	92	83	87	78

Find the equation of the regression line.

- A) $\hat{y} = 92.3 - 0.669x$ B) $\hat{y} = 2.02x - 47.3$ C) $\hat{y} = 2.81 + 1.35x$ D) $\hat{y} = 1.02x + 11.7$
- 7) Given the linear correlation coefficient r and the sample size n , determine whether or not the given r represents a significant linear correlation. Use a significance level of 0.05.
 $r = -0.605$, $n = 15$
- A) significant linear correlation
 B) no significant linear correlation
 C) cannot determine with the information given
- 8) Eight pairs of data yield $r = 0.708$ and the regression equation $\hat{y} = 55.8 + 2.79x$. Also, $\bar{y} = 71.1$. What is the best predicted value of y for $x = 6.1$? Use a significance level of $\alpha = 0.05$.
- A) 57.8 B) 343.1 C) 72.8 D) 71.1
- 9) Based on the data from six students, the regression equation relating number of hours of preparation (x) and test score (y) is $\hat{y} = 67.3 + 1.07x$. The same data yield $r = 0.724$ and $\bar{y} = 75.2$. What is the best predicted test score for a student who spent 6 hours preparing for the test? Use a significance level of $\alpha = 0.05$.
- A) 78.1 B) 59.7 C) 75.2 D) 73.7

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Test the claim using the P-value method of hypothesis testing. Be sure to show your work and clearly identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim. Assume that the samples are independent and that they have been randomly selected.

- 10) 7 of 8,500 people vaccinated against a certain disease later developed the disease. 18 of 10,000 people vaccinated with a placebo later developed the disease. Test the claim that the vaccine is effective in lowering the incidence of the disease. Use a significance level of 0.05.

Test the claim using the P-value method of hypothesis testing. Be sure to show your work and clearly identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim. Assume that the two samples are independent and that they have been randomly selected.

- 11) A researcher wishes to determine whether people with high blood pressure can reduce their blood pressure by following a particular diet. Use the sample data below to test the claim that the treatment population mean μ_1 is different than the control population mean μ_2 . Test the claim using a significance level of 0.01.

<u>Treatment Group</u>	<u>Control Group</u>
$n_1 = 85$	$n_2 = 75$
$\bar{x}_1 = 189.1$	$\bar{x}_2 = 203.7$
$s_1 = 38.7$	$s_2 = 39.2$

Test the claim using the P-value method of hypothesis testing. Be sure to show your work and clearly identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim. Assume that two dependent samples have been randomly selected from normally distributed populations.

- 12) The table below shows the weights of seven subjects before and after following a particular diet for two months.

Subject	A	B	C	D	E	F	G
Before	191	175	197	153	168	197	164
After	184	166	195	158	154	199	152

Using a 0.01 level of significance, test the claim that the diet is effective in reducing weight.

Test the claim using the P-value method of hypothesis testing. Be sure to show your work and clearly identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

- 13) Use a significance level of 0.10 to test the claim that workplace accidents are distributed on workdays as follows: Monday 25%, Tuesday: 15%, Wednesday: 15%, Thursday: 15%, and Friday: 30%. In a study of 100 workplace accidents, 26 occurred on a Monday, 16 occurred on a Tuesday, 18 occurred on a Wednesday, 12 occurred on a Thursday, and 28 occurred on a Friday.