Read these directions carefully. As usual, you may pick any part of one problem to omit by writing OMIT in the answer blank (any one multiple choice or any one part of the other problems). If you do not, or mark more than one omit, then all parts will be graded. Relax and use your time wisely.

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

Assume that a hypothesis test of the given claim will be conducted. Identify the type I or type II error for the test.

1) A statistics teacher claims that 12% of children suffer from the disorder "mathphobia." Identify the type I error for the test. 1) _____
   A) Reject the claim that the percentage of children who suffer from the disorder is different from 12% when that percentage really is different from 12%.
   B) Reject the claim that the percentage of children who suffer from the disorder is equal to 12% when that percentage is actually 12%.
   C) Fail to reject the claim that the percentage of children who suffer from the disorder is equal to 12% when that percentage is actually 12%.
   D) Fail to reject the claim that the percentage of children who suffer from the disorder is equal to 12% when that percentage is actually different from 12%.

2) The owner of a hotdog stand claims that the mean attendance at Trump rallies is over 72,100,and she is therefore justified in enlarging her stand before the next rally. Identify the type II error for the test. 2) _____
   A) Reject the claim that the mean attendance is equal to 72,100, when it is actually less than 72,100.
   B) Fail to reject the claim that the mean attendance is equal to 72,100, when it is actually over 72,100.
   C) Reject the claim that the mean attendance is equal to 72,100 when it is actually 72,100.
   D) Fail to reject the claim that the mean attendance is more than 72,100, when it is actually less than 72,100.

Express the null hypothesis and the alternative hypothesis in symbolic form. Use the correct symbol (μ, p, σ) for the indicated parameter.

3) A psychologist claims that more than 1.9 percent of the population likes to eat dirt. 3) _____

A)	B)	C)	D)
H_0: $p = 1.9\%$	H_0: $p < 1.9\%$	H_0: $p = 1.9\%$	H_0: $p > 1.9\%$
H_1: $p < 1.9\%$	H_1: $p \geq 1.9\%$	H_1: $p > 1.9\%$	H_1: $p \leq 1.9\%$

Find the value of the test statistic z.

4) The claim is that the proportion of accidental deaths of the elderly attributable to residential falls is more than 0.10, and the sample statistics include n = 800 deaths of the elderly with 15% of them attributable to residential falls. 4) _____
   A) –4.71 B) –3.96 C) 3.96 D) 4.71

Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$. Use the given sample sizes and numbers of successes to find the z test statistic for the hypothesis test.

5) A random sampling of sixty pitchers from the National League and fifty–two pitchers from the American League showed that 18 National and 12 American League pitchers had E.R.A's below 3.5. 5) _____

A) $z = 11.593$ B) $z = 1.073$ C) $z = 143.387$ D) $z = 0.825$

Find the P–value for the indicated hypothesis test.

6) A random sample of 139 forty–year–old men contains 26% snorters. Find the P–value for a test of the claim that the percentage of forty–year–old men that snort is 22%. 6) _____

A) 0.1401 B) 0.1271 C) 0.2802 D) 0.2671

Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 = p_2$, Use the given sample sizes and numbers of successes to find the P–value for the hypothesis test.

7) $n_1 = 50$ $n_2 = 50$ 7) _____

$x_1 = 8$ $x_2 = 7$

A) 0.3897 B) 0.6103 C) 0.2206 D) 0.7794

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.

8) A marketing survey involves product recognition in New York and California. Of 558 New Yorkers surveyed, 193 knew the product while 196 out of 614 Californians knew the product. Construct a 99% confidence interval for the difference between the two population proportions. 8) _____

A) $-0.0443 < p_1 - p_2 < 0.0976$ B) $-0.0034 < p_1 - p_2 < 0.0566$

C) $0.0247 < p_1 - p_2 < 0.0286$ D) $-0.0177 < p_1 - p_2 < 0.1243$

Provide an appropriate response.

9) Suppose we wish to test the claim that the mean of a population is greater than 6.1. Find the test statistic for a sample with $n = 15$, $\bar{x} = 6.4$, $s = 0.8$, and $\alpha = 0.05$. 9) _____

A) 1.452 B) 1.631 C) 1.728 D) 1.312

10) Listed below are a random sample of the brain volumes of unrealated subjects that are taking a statistics course. Find the P value needed to test the claim that the population of brain volumes is not 1100 cubic centimeters. Use a 0.01 level of significance. 10) _____

963 1027 1272 1079 1070 1173 1204

A) 0.0330 B) 0.0165 C) 0.768 D) 2.756

11) For the hypothesis test in the previous problem (brain volumes), find the critical value(s) 11) _____

A) 3.143 B) +/- 3.499 C) +/- 3.707 D) 2.998

Determine whether the samples are independent or dependent.

12) The effectiveness of a headache medicine is tested by measuring the intensity of a headache in patients before and after drug treatment. The data consist of before and after intensities for each patient. 12) _____

A) Independent samples B) Dependent samples

Construct the confidence interval for the difference between the two population means.

13) A researcher obtained independent simple random samples of 16 people who do not exercise regularly and 12 people who do exercise regularly (both population are normal). The resting pulse rates (in beats per minute) were recorded below. 13) _____

Do not exercise regularly	Exercise regularly
$\bar{x}_1 = 72.6$ beats/min	$\bar{x}_2 = 68.2$ beats/min
$s_1 = 10.9$ beats/min	$s_2 = 8.2$ beats/min
$n_1 = 16$	$n_2 = 12$

Construct a 95% confidence interval for $\mu_1 - \mu_2$.

A) -3.04 beats/min $< \mu_1 - \mu_2 < 11.84$ beats/min

B) -3.35 beats/min $< \mu_1 - \mu_2 < 12.15$ beats/min

C) -3.02 beats/min $< \mu_1 - \mu_2 < 11.82$ beats/min

D) -3.33 beats/min $< \mu_1 - \mu_2 < 12.13$ beats/min

Describe the values of the test statistic that would result in rejectiing the null hypothesis.

14) A farmer has decided to use a new additive to grow his crops. He divided his farm into 10 paired plots and kept records of the corn yield (in bushels) before and after using the additive. The results are shown below. 14) _____

Plot:	1	2	3	4	5	6	7	8	9	10
Before	9	9	8	7	6	8	5	9	10	11
After	10	9	9	8	7	10	6	10	10	12

You wish the test the following hypothesis at the 1 percent level of significance.

H_0: $\mu_d = 0$ against H_1: $\mu_d > 0$.

What decision rule would you use?

A) Reject H_0 if test statistic is greater than 2.821.

B) Reject H_0 if test statistic is greater than -2.821.

C) Reject H_0 if test statistic is greater than -2.821 or less than 2.821.

D) Reject H_0 if test statistic is less than 2.821.

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

Use the traditional method of hypothesis testing to test the given claim about the means of two populations. Assume that two dependent samples have been randomly selected from normally distributed populations. Each part is 3 points.

15) Five students took a math test before and after aerobic tutoring. Their scores were as follows.

Subject	Abe	Betty	Clyde	Debo	Eli
Before	68	68	70	80	78
After	72	77	68	83	90

Using a 0.01 level of significance, test the claim that aerobic tutoring has an effect on (makes a difference in) the math scores.

a) Write the null and alternative hypothesis in symbolic form (use the correct symbol).

b) Find the critical value(s)

c) Draw the curve and label the rejection region(s) "reject Ho". Place the critical values on the graph.

d) Evaluate the test statistic.

e) Determine the p–value.

f) State your decision (exactly as we did repeatedly in class)

g) State your conclusion (exactly as we did repeatedly in class)

Use the traditional method to test the given hypothesis. Assume that the samples are independent and that they have been randomly selected

16) Use the given sample data to test the claim that the proprtion of students who injest mammal egesta are more likely to graduate in six years than those that ingest a placebo. Use a 0.01 level of significance.

egesta	placebo
$n_1 = 85$	$n_2 = 90$
$x_1 = 38$	$x_2 = 23$

a) Write the null and alternative hypothesis in symbolic form (use the correct symbol).

b) Find the critical value(s)

c) Draw the curve and label the rejection region(s) "reject Ho". Place the critical values on the graph.

d) Find and evaluate the test statistic

e) Determine the p–value.

f) State your decision (exactly as we did repeatedly in class)

g) State your conclusion (exactly as we did repeatedly in class)

1) B
2) B
3) C
4) D
5) D
6) D
7) D
8) A
9) A
10) C
11) C
12) B
13) C
14) A
15) H_0: $\mu_d = 0$. H_1: $\mu_d \neq 0$. Test statistic: t = –2.134. Critical values: t = 4.604, –4.604. P-value 0.0998, Fail to reject H_0. There is not sufficient evidence conclude that aerobic tutoring has an effect at the 0.01 level of significance.

16) H_0: $p_1 = p_2$. H_1: $p_1 > p_2$.
Test statistic: z = 2.66. Critical value: z = 2.33. P-value 0.00394.
Reject the null hypothesis. There is sufficient evidence to conclude are more likely to graduate in six years than those that ingest a placebo at the 0.01 level of significance·