Name_____ Course Number:_____ Section Number:_____

Directions: Answer the questions and solve the problems in the spaces provided, or attach paper. Circle the correct choice for each response set.

Provide an appropriate response.

1) Define independent and dependent samples and give an example of each.

2) In the context of a hypothesis test for two proportions, which of the following statements about the pooled sample proportion, $\bar{p}$, is/are true?
I. It estimates the common value of p_1 and p_2 under the assumption of equal proportions.
II. It is obtained by averaging the two sample proportions $\hat{p}_1$ and $\hat{p}_2$.
III. It is equal to the proportion of successes in both samples combined.

   A) I and III   B) III only   C) I and II   D) I, II, and III

Find the number of successes x suggested by the given statement.

3) Among 900 people selected randomly from among the residents of one city, 18.56% were found to be living below the official poverty line.

   A) 170   B) 171   C) 164   D) 167

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 pooled estimate $\bar{p}$. Round your answer to the nearest thousandth.

4) $n_1 = 34$ $n_2 = 414$
    $x_1 = 15$ $x_2 = 105$

   A) 0.107   B) 0.214   C) 0.268   D) 0.321

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) In a vote on the Clean Water bill, 44% of the 205 Democrats voted for the bill while 46% of the 230 Republicans voted for it.

   A) $z = -0.355$ B) $z = -0.418$ C) $z = -0.251$ D) $z = -0.460$

Find the critical z value(s) for the given hypothesis test.

6) The table shows the number satisfied in their work in a sample of working adults with a college education and in a sample of working adults without a college education. Do the data provide sufficient evidence that a greater proportion of those with a college education are satisfied in their work? Assume that you plan to use a significance level of $\alpha = 0.05$ to test the claim that $p_1 > p_2$. (Use computer software to answer the question.)

	College Education	No College Education
Number in sample	169	162
Number satisfied in their work	74	68

A) z = –1.645; yes

B) z = 1.645; no

C) z = ± 1.96; yes

D) z = 1.96; no

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) $n_1 = 100$ $n_2 = 140$
   $x_1 = 41$ $x_2 = 35$

A) 0.0021   B) 0.0086   C) 0.4211   D) 0.0512

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

8) 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. Test the claim that the proportion of smokers in the two age groups is the same. Use a significance level of 0.01.

Determine whether the samples are independent or dependent.

9) The effectiveness of a new headache medicine is tested by measuring the amount of time before the headache is cured for patients who use the medicine and another group of patients who use a placebo drug.

A) Independent samples   B) Dependent samples

Test the indicated claim about the means of two populations. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal. Use the traditional method or P–value method as indicated.

10) A researcher was interested in comparing the response times of two different cab companies. Companies A and B were each called at 50 randomly selected times. The calls to company A were made independently of the calls to company B. The response times for each call were recorded. The summary statistics were as follows:

	Company A	Company B
Mean response time	7.6 mins	6.9 mins
Standard deviation	1.4 mins	1.7 mins

Use a 0.02 significance level to test the claim that the mean response time for company A is the same as the mean response time for company B. Use the P–value method of hypothesis testing.

State what the given confidence interval suggests about the two population means.

11) A researcher was interested in comparing the amount of time spent watching television by women and by men. Independent simple random samples of 14 women and 17 men were selected, and each person was asked how many hours he or she had watched television during the previous week. The summary statistics are as follows.

Women	Men
$\overline{x}_1 = 12.9$ hrs	$\overline{x}_2 = 14.0$ hrs
$s_1 = 3.9$ hrs	$s_2 = 5.2$ hrs
$n_1 = 14$	$n_2 = 17$

The following 99% confidence interval was obtained for $\mu_1 - \mu_2$, the difference between the mean amount of time spent watching television for women and the mean amount of time spent watching television for men: -5.61 hrs $< \mu_1 - \mu_2 < 3.41$ hrs.
What does the confidence interval suggest about the population means?

A) The confidence interval includes only positive values which suggests that the mean amount of time spent watching television for women is larger than the mean amount of time spent watching television for men.

B) The confidence interval limits include 0 which suggests that the two population means are unlikely to be equal. There appears to be a significant difference between the mean amount of time spent watching television for women and the mean amount of time spent watching television for men.

C) The confidence interval limits include 0 which suggests that the two population means might be equal. There does not appear to be a significant difference between the mean amount of time spent watching television for women and the mean amount of time spent watching television for men.

D) The confidence interval includes only negative values which suggests that the mean amount of time spent watching television for women is smaller than the mean amount of time spent watching television for men.

Perform the indicated hypothesis test. Assume that the two samples are independent simple random samples selected from normally distributed populations. Also assume that the population standard deviations are equal ($\sigma_1 = \sigma_2$), so that the standard error of the difference between means is obtained by pooling the sample variances .

12) A researcher was interested in comparing the amount of time spent watching television by women and by men. Independent simple random samples of 14 women and 17 men were selected, and each person was asked how many hours he or she had watched television during the previous week. The summary statistics are as follows.

Women	Men
$\overline{x}_1 = 12.9$ hr	$\overline{x}_2 = 16.3$ hr
$s_1 = 4.2$ hr	$s_2 = 4.4$ hr
$n_1 = 14$	$n_2 = 17$

Use a 0.05 significance level to test the claim that the mean amount of time spent watching television by women is smaller than the mean amount of time spent watching television by men. Use the traditional method of hypothesis testing.

Use the computer display to solve the problem.

13) When testing for a difference between the means of a treatment group and a placebo group, the computer display below is obtained. Using a 0.05 significance level, is there sufficient evidence to support the claim that the treatment group (variable 1) comes from a population with a mean that is less than the mean for the placebo population? Explain.

	t-Test: Two Sample for Means		
1		Variable 1	Variable 2
2	Mean	65.10738	66.18251
3	Known Variance	8.102938	10.27387
4	Observations	50	50
5	Hypothesized Mean Difference	0	
6	t	-1.773417	
7	P(T<=t) one-tail	0.0384	
8	T Critical one-tail	1.644853	
9	P(T<=t) two-tail	0.0768	
10	t Critical two-tail	1.959961	

The two data sets are dependent. Find $\overline{d}$ to the nearest tenth.

14)
A	70	67	56	63	51
B	22	24	29	25	22

     A) 46.3   B) 37.0   C) 48.1   D) 22.2

Assume that you want to test the claim that the paired sample data come from a population for which the mean difference is $\mu_d = 0$. Compute the value of the t test statistic. Round intermediate calculations to four decimal places as needed and final answers to three decimal places as needed.

15)
x	33	30	27	29	32	27	34	27
y	31	26	33	29	33	32	34	26

     A) $t = -0.523$ B) $t = -0.185$ C) $t = 0.690$ D) $t = -1.480$

Determine the decision criterion for rejecting the null hypothesis in the given hypothesis test; i.e., describe the values of the test statistic that would result in rejection of the null hypothesis.

16) Suppose you wish to test the claim that μ_d, the mean value of the differences d for a population of paired data, is different from 0. Given a sample of n = 23 and a significance level of $\alpha = 0.05$, what criterion would be used for rejecting the null hypothesis?

     A) Reject null hypothesis if test statistic > 1.717.

     B) Reject null hypothesis if test statistic > 1.717 or < −1.717.

     C) Reject null hypothesis if test statistic > 2.074 or < −2.074.

     D) Reject null hypothesis if test statistic > 2.069 or < −2.069.

Construct a confidence interval for μ_d, the mean of the differences d for the population of paired data. Assume that the population of paired differences is normally distributed.

17) Ten different families are tested for the number of gallons of water a day they use before and after viewing a conservation video. Construct a 90% confidence interval for the mean of the differences.

Before	33	33	38	33	35	35	40	40	40	31
After	34	28	25	28	35	33	31	28	35	33

     A) $1.8 < \mu_d < 7.8$ B) $1.5 < \mu_d < 8.1$

     C) $2.5 < \mu_d < 7.1$ D) $3.8 < \mu_d < 5.8$

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.

18) 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	180	188	172	193	195	168	158
After	173	179	170	198	181	170	146

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

Test the indicated claim about the variances or standard deviations of two populations. Assume that both samples are independent simple random samples from populations having normal distributions.

19) A researcher obtained independent random samples of men from two different towns. She recorded the weights of the men. The results are summarized below:

Town A

$n_1 = 41$

$\bar{x}_1 = 165.1$ lb

$s_1 = 34$ lb

Town B

$n_2 = 21$

$\bar{x}_2 = 159.5$ lb

$s_2 = 29$ lb

Use a 0.05 significance level to test the claim that there is more variation in weights of men from town A than in weights of men from town B.

20) Test scores for random samples of students from two different schools were recorded. The summary statistics are given below.

School A	School B
$n = 31$	$n = 25$
$\overline{x}_1 = 63.7$	$\overline{x}_2 = 59.2$
$s_1 = 4.7$	$s_2 = 4.62$

Use a 0.05 significance level to test the claim that the standard deviation of test scores for students from school A is different from the standard deviation of test scores for students from school B.

1) Independent samples are not related in any way. Dependent samples are related. Examples will vary. One answer follows. Independent: Two groups of people, each group trying a different weight loss program. Dependent: Same participants in a special diet program with before and after weight measurements.

2) A

3) D

4) C

5) B

6) B

7) B

8) H_0: $p_1 = p_2$. H_1: $p_1 \neq p_2$.

   Test statistic: $z = 3.19$.   Critical values: $z = \pm 2.575$.

   Reject the null hypothesis. There is sufficient evidence to warrant rejection of the claim that the proportion of smokers in the two age groups is the same.

9) A

10) H_0: $\mu_1 = \mu_2$

   H_1: $\mu_1 \neq \mu_2$

   Test statistic: $t = 2.248$

   $0.02 < P-value < 0.05$ (by Table A–3); P–value $= 0.0269$ (by STATDISK & TI–84+ calulator)

   Do not reject H_0. At the 2% significance level, there is not sufficient evidence to warrant rejection of the claim that the mean response time for company A is the same as the mean response time for company B.

11) C

12) H_0: $\mu_1 = \mu_2$

   H_1: $\mu_1 < \mu_2$

   Test statistic: $t = -2.185$

   Critical value: $t = -1.699$

   Reject H_0. At the 5% significance level, there is sufficient evidence to support the claim that the mean amount of time spent watching television by women is smaller than the mean amount of time spent watching television by men.

13) Yes, the P–value for a one–tail test is 0.0384, which is smaller than the significance level of 0.05. There is sufficient evidence to support the claim that the mean for the treatment group is smaller than the mean for the placebo group.

14) B

15) A

16) C

17) A

18) H_0: $\mu_d = 0$. H_1: $\mu_d > 0$.

   Test statistic $t = 1.954$. Critical value: $t = 3.143$.

   Fail to reject H_0. There is not sufficient evidence to support the claim that the diet is effective in reducing weight.

19) H_0: $\sigma_1 = \sigma_2$ H_1: $\sigma_1 > \sigma_2$

   Test statistic: $F = 1.3746$.

   Upper critical F value: 1.9938 (by Table A–5).

   P–value $= 0.2250$ (by STATDISK & TI–84+ calculator).

   Fail to reject the null hypothesis. There is not sufficient evidence to support the claim that there is more variation in weights of men from town A than in weights of men from town B.

20) H_0: $\sigma_1 = \sigma_2$ H_1: $\sigma_1 \neq \sigma_2$

Test statistic: F = 1.0349.

Upper critical F value: 2.2090 (by Table A-5).

P-value = 0.9415 (by STATDISK & TI-84+ calculator).

Fail to reject the null hypothesis. There is not sufficient evidence to support the claim that the standard deviation of test scores for students from school A is different from the standard deviation of test scores for students from school B.