Second Exam - Statistics 13
December 5, 2014

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

Solve the problem.

1) A 90% confidence interval for the mean percentage of airline reservations being canceled on the day of the flight is (3%, 6.1%). What is the point estimator of the mean percentage of reservations that are canceled on the day of the flight? 1) _____

A) 3.05% B) 3.1% C) 4.55% D) 1.55%

2) A retired statistician was interested in determining the average cost of a $200,000.00 term life insurance policy for a 60-year-old male non-smoker. He randomly sampled 65 subjects (60-year-old male non-smokers) and constructed the following 95 percent confidence interval for the mean cost of the term life insurance: ($850.00, $1050.00). What value of alpha was used to create this confidence interval? 2) _____

A) 0.05 B) 0.01 C) 0.10 D) 0.025

3) Find $z_{\alpha/2}$ for the given value of α. 3) _____

$\alpha = 0.14$

A) 1.08 B) 1.58 C) 0.14 D) 1.48

4) Let t_0 be a specific value of t. Find t_0 such that the following statement is true: 4) _____

$P(t \leq t_0) = .05$ where df = 20.

A) 1.729 B) -1.729 C) 1.725 D) -1.725

5) How much money does the average professional football fan spend on food at a single football game? That question was posed to ten randomly selected football fans. The sampled results show that the sample mean and sample standard deviation were $70.00 and $17.50, respectively. Use this information to create a 95 percent confidence interval for the population mean. 5) _____

A) $70 \pm 2.262\left(\frac{17.50}{\sqrt{60}}\right)$ B) $70 \pm 1.960\left(\frac{17.50}{\sqrt{60}}\right)$

C) $70 \pm 1.833\left(\frac{17.50}{\sqrt{60}}\right)$ D) $70 \pm 2.228\left(\frac{17.50}{\sqrt{60}}\right)$

6) A marketing research company is estimating the average total compensation of CEOs in the service industry. Data were randomly collected from 18 CEOs and the 90% confidence interval for the mean was calculated to be ($2,181,260, $5,836,180). What additional assumption is necessary for this confidence interval to be valid? 6) _____

A) The population of total compensations of CEOs in the service industry is approximately normally distributed.

B) The distribution of the sample means is approximately normal.

C) The sample standard deviation is less than the degrees of freedom.

D) None. The Central Limit Theorem applies.

7) A study was conducted to determine what proportion of all college students considered themselves as full-time students. A random sample of 300 college students was selected and 210 of the students responded that they considered themselves full-time students. A computer program was used to generate the following 95% confidence interval for the population proportion: (0.64814, 0.75186). Which of the following practical interpretations is correct for this confidence interval? 7) _____

A) We are 95% confident that the percentage of all college students who consider themselves full-time students falls between 0.648 and 0.752.

B) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students falls between 0.648 and 0.752.

C) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students was 0.700.

D) We are 95% confident that the percentage of all college students who consider themselves full-time students was 0.700.

8) It is desired to estimate the average time it takes Statistics students to finish a computer project to within two hours at 90% reliability. It is estimated that the standard deviation of the times is 14 hours. How large a sample should be taken to get the desired interval? 8) _____

A) $n = 189$ B) $n = 133$ C) $n = 231$ D) $n = 325$

9) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but are now beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. What null and alternative hypothesis should be tested? 9) _____

A) $H_0: \mu \leq 215$ vs. $H_A: \mu > 215$ B) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$

C) $H_0: \mu = 215$ vs. $H_A: \mu \neq 215$ D) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$

10) A significance level for a hypothesis test is given as $\alpha = .01$. Interpret this value. 10) _____

A) There is a 1% chance that the sample will be biased.

B) The probability of making a Type II error is .99.

C) The probability of making a Type I error is .01.

D) The smallest value of α that you can use and still reject H_0 is .01.

Find the rejection region for the specified hypothesis test.

11) Consider a test of $H_0: \mu = 11$. For the following case, give the rejection region for the test in terms of the z-statistic: $H_a: \mu \neq 11$, $\alpha = 0.05$ 11) _____

A) $z > 1.645$ B) $|z| > 1.645$ C) $|z| > 1.96$ D) $z > 1.96$

Solve the problem.

12) A national organization has been working with utilities throughout the nation to find sites for large wind machines that generate electricity. Wind speeds must average more than 22 miles per hour (mph) for a site to be acceptable. Recently, the organization conducted wind speed tests at a particular site. Based on a sample of $n = 47$ wind speed recordings (taken at random intervals), the wind speed at the site averaged $\bar{x} = 22.7$ mph, with a standard deviation of $s = 4.4$ mph. To determine whether the site meets the organization's requirements, consider the test, H_0: $\mu \leq 22$ vs. H_a: $\mu > 22$, where μ is the true mean wind speed at the site and $\alpha = .01$. Suppose the value of the test statistic were computed to be 1.09. State the conclusion. 12) _____

A) We are 99% confident that the site meets the organization's requirements.
B) At $\alpha = .01$, there is insufficient evidence to conclude the true mean wind speed at the site exceeds 22 mph.
C) At $\alpha = .01$, there is sufficient evidence to conclude the true mean wind speed at the site exceeds 22 mph.
D) We are 99% confident that the site does not meet the organization's requirements.

13) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of n = 200 cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. Find the large-sample rejection region appropriate for this test if we are using $\alpha = 0.05$. 13) _____

A) Reject H_0 if $z < -1.96$.
B) Reject H_0 if $z > 1.645$.
C) Reject H_0 if $z < -1.96$ or $z > 1.96$.
D) Reject H_0 if $z < -1.645$ or $z > 1.645$.

14) A local eat-in pizza restaurant wants to investigate the possibility of starting to deliver pizzas. The owner of the store has determined that home delivery will be successful only if the average time spent on a delivery does not exceed 35 minutes. The owner has randomly selected 22 customers and delivered pizzas to their homes in order to test whether the mean delivery time actually exceeds 35 minutes. Suppose the p-value for the test was found to be .0281. State the correct conclusion. 14) _____

A) At $\alpha = .02$, we reject H_0.
B) At $\alpha = .05$, we fail to reject H_0.
C) At $\alpha = .025$, we fail to reject H_0.
D) At $\alpha = .03$, we fail to reject H_0.

15) A bottling company produces bottles that hold 12 ounces of liquid. Periodically, the company gets complaints that their bottles are not holding enough liquid. To test this claim, the bottling company randomly samples 16 bottles and finds the average amount of liquid held by the bottles is 11.6 ounces with a standard deviation of .2 ounce. Calculate the appropriate test statistic. 15) _____

A) $t = -8.000$
B) $t = -7.746$
C) $t = -3.578$
D) $t = -32.000$

16) The business college computing center wants to determine the proportion of business students who have laptop computers. If the proportion differs from 25%, then the lab will modify a proposed enlargement of its facilities. Suppose a hypothesis test is conducted and the test statistic is 2.4. Find the p-value for a two-tailed test of hypothesis. 16) _____

A) .4918
B) .0082
C) .0164
D) .4836

17) Eight SmartCars were randomly selected and the highway mileage of each was noted. The highway mileage per gallon for each car is shown below: 17) _____

32 42 29 34 41 37 38 39 40

It was desired to determine if the median miles per gallon of all SmartCars exceeded 35 miles per gallon. Identify the test statistic that should be used when conducting the Sign Test.

A) S = 6 B) S = 8 C) S = 2 D) S = 38

18) A certain manufacturer is interested in evaluating two alternative manufacturing plans consisting of different machine layouts. Because of union rules, hours of operation vary greatly for this particular manufacturer from one day to the next. Twenty-eight random working days were selected and each plan was monitored and the number of items produced each day was recorded. Some of the collected data is shown below: 18) _____

DAY	PLAN 1 OUTPUT	PLAN 2 OUTPUT
1	1234 units	1311 units
2	1355 units	1366 units
3	1300 units	1289 units

What type of analysis will best allow the manufacturer to determine which plan is more effective?

A) A test of a single population proportion.
B) An independent samples comparison of population means.
C) A paired difference comparison of population means.
D) An independent samples comparison of population proportions.

19) A marketing study was conducted to compare the mean age of male and female purchasers of a certain product. Random and independent samples were selected for both male and female purchasers of the product. What type of analysis should be used to compare the mean age of male and female purchasers? 19) _____

A) A test of a single population mean.
B) A paired difference comparison of population means.
C) An independent samples comparison of population proportions.
D) An independent samples comparison of population means.

20) University administrators are trying to decide where to build a new parking garage on campus. The state legislature has budgeted just enough money for one parking structure on campus. The administrators have determined that the parking garage will be built either by the college of engineering or by the college of business. To help make the final decision, the university has randomly and independently asked students from each of the two colleges to estimate how long they usually take to find a parking spot on campus (in minutes). Suppose that the sample sizes selected by the university for the two samples were both $n_e = n_b = 15$. What critical value should be used by the university in the calculations for the 95% confidence interval for $\mu_e - \mu_b$? Assume that the university used the pooled estimate of the population variances in the calculation of the confidence interval. 20) _____

A) t = 2.048 B) z = 1.96 C) t = 1.701 D) z = 1.645 E) t = 2.042

21) A researcher is investigating which of two newly developed automobile engine oils is better at prolonging the life of an engine. Since there are a variety of automobile engines, 20 different engine types were randomly selected and were tested using each of the two engine oils. The number of hours of continuous use before engine breakdown was recorded for each engine oil. Based on the information provided, what type of analysis will yield the most useful information? 21) _____

A) Independent samples comparison of population proportions.
B) Matched pairs comparison of population means.
C) Independent samples comparison of population means.
D) Matched pairs comparison of population proportions.

22) We are interested in comparing the average supermarket prices of two leading colas. Our sample was taken by randomly selecting eight supermarkets and recording the price of a six-pack of each brand of cola at each supermarket. The data are shown in the following table: 22) _____

	Price		
Supermarket	Brand 1	Brand 2	Difference
1	\$2.25	\$2.30	\$-0.05
2	2.47	2.45	0.02
3	2.38	2.44	-0.06
4	2.27	2.29	-0.02
5	2.15	2.25	-0.10
6	2.25	2.25	0.00
7	2.36	2.42	-0.06
8	2.37	2.40	-0.03
	$x_1 = 2.3125$	$x_2 = 2.3500$	$d = -0.0375$
	$s_1 = 0.1007$	$s_2 = 0.0859$	$s_d = 0.0381$

Find a 98% confidence interval for the difference in mean price of brand 1 and brand 2.

A) 0.0375 ± 0.0347 B) 0.0375 ± 0.1393 C) 0.0375 ± 0.0471 D) 0.0375 ± 0.0404

23) A paired difference experiment yielded n_d pairs of observations. For the given case, what is the rejection region for testing H_0: $\mu_d \leq 9$ against Ha: $\mu_d > 9$? 23) _____

$n_d = 15$, $\alpha = 0.1$

A) $t < 1.345$ B) $t > 13.41$ C) $t > 1.345$ D) $t < 1.761$

24) Online classes are becoming more and more prevalent at the college level. A statistics instructor randomly sampled ten students from his traditional face-to-face class and ten students from his online class to compare their comprehension of the material that was taught in the class. He administered the same final exam to each student and wants to use the Wilcoxon Rank Sum test to compare their exam scores. The results are shown below: 24) _____

Traditional Class	**Online Class**
82 91 75 68	67 66 72 73
93 85 74 70	77 76 48 81
56 82	86 92

Calculate the test statistic for the Wilcoxon Rank Sum Test.

A) $T_1 = 60$ B) $T_1 = 44$ C) $T_1 = 120$ D) $T_1 = 76$

25) When blood levels are low at an area hospital, a call goes out to local residents to give blood. The blood center is interested in determining which sex - males or females - is more likely to respond. Random, independent samples of 60 females and 100 males were each asked if they would be willing to give blood when called by a local hospital. A success is defined as a person who responds to the call and donates blood. The goal is to compare the percentage of the successes of the male and female responses. Suppose 45 of the females and 60 of the males responded that they were able to give blood. Find the test statistic that would be used if it is desired to test to determine if a difference exists between the proportion of the females and males who responds to the call to donate blood. 25) _____

A) $z = 1.93$ B) $z = 1.96$ C) $z = 1.645$ D) $z = 2.01$

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

Solve the problem.

1) A 90% confidence interval for the mean percentage of airline reservations being canceled on the day of the flight is (2.2%, 5.9%). What is the point estimator of the mean percentage of reservations that are canceled on the day of the flight? 1) _____

A) 1.85% B) 3.7% C) 2.95% D) 4.05%

2) A retired statistician was interested in determining the average cost of a $200,000.00 term life insurance policy for a 60-year-old male non-smoker. He randomly sampled 65 subjects (60-year-old male non-smokers) and constructed the following 95 percent confidence interval for the mean cost of the term life insurance: ($850.00, $1050.00). What value of alpha was used to create this confidence interval? 2) _____

A) 0.05 B) 0.025 C) 0.01 D) 0.10

3) Find $z_{\alpha/2}$ for the given value of α. 3) _____

$\alpha = 0.02$

A) 2.05 B) 2.33 C) 3.08 D) 0.18

4) Let t_0 be a specific value of t. Find t_0 such that the following statement is true: 4) _____

$P(t \leq t_0) = .05$ where df = 20.

A) -1.725 B) -1.729 C) 1.725 D) 1.729

5) How much money does the average professional football fan spend on food at a single football game? That question was posed to ten randomly selected football fans. The sampled results show that the sample mean and sample standard deviation were $70.00 and $17.50, respectively. Use this information to create a 95 percent confidence interval for the population mean. 5) _____

A) $70 \pm 2.262\left(\frac{17.50}{\sqrt{60}}\right)$ B) $70 \pm 1.833\left(\frac{17.50}{\sqrt{60}}\right)$

C) $70 \pm 1.960\left(\frac{17.50}{\sqrt{60}}\right)$ D) $70 \pm 2.228\left(\frac{17.50}{\sqrt{60}}\right)$

6) A marketing research company is estimating the average total compensation of CEOs in the service industry. Data were randomly collected from 18 CEOs and the 99% confidence interval for the mean was calculated to be ($2,181,260, $5,836,180). What additional assumption is necessary for this confidence interval to be valid? 6) _____

A) The distribution of the sample means is approximately normal.
B) The sample standard deviation is less than the degrees of freedom.
C) None. The Central Limit Theorem applies.
D) The population of total compensations of CEOs in the service industry is approximately normally distributed.

7) A study was conducted to determine what proportion of all college students considered themselves as full-time students. A random sample of 300 college students was selected and 210 of the students responded that they considered themselves full-time students. A computer program was used to generate the following 95% confidence interval for the population proportion: (0.64814, 0.75186). Which of the following practical interpretations is correct for this confidence interval? 7) _____

A) We are 95% confident that the percentage of all college students who consider themselves full-time students falls between 0.648 and 0.752.

B) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students was 0.700.

C) We are 95% confident that the percentage of all college students who consider themselves full-time students was 0.700.

D) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students falls between 0.648 and 0.752.

8) It is desired to estimate the average time it takes Statistics students to finish a computer project to within two hours at 90% reliability. It is estimated that the standard deviation of the times is 14 hours. How large a sample should be taken to get the desired interval? 8) _____

A) $n = 325$ B) $n = 133$ C) $n = 189$ D) $n = 231$

9) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but are now beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. What null and alternative hypothesis should be tested? 9) _____

A) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$ B) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$

C) $H_0: \mu \leq 215$ vs. $H_A: \mu > 215$ D) $H_0: \mu = 215$ vs. $H_A: \mu \neq 215$

10) A significance level for a hypothesis test is given as $\alpha = .01$. Interpret this value. 10) _____

A) There is a 1% chance that the sample will be biased.

B) The smallest value of α that you can use and still reject H_0 is .01.

C) The probability of making a Type I error is .01.

D) The probability of making a Type II error is .99.

Find the rejection region for the specified hypothesis test.

11) Consider a test of $H_0: \mu = 12$. For the following case, give the rejection region for the test in terms of the z-statistic: $H_a: \mu \neq 12$, $\alpha = 0.10$ 11) _____

A) $|z| > 1.28$ B) $z > 1.28$ C) $|z| > 1.645$ D) $z > 1.645$

Solve the problem.

12) A national organization has been working with utilities throughout the nation to find sites for large wind machines that generate electricity. Wind speeds must average more than 16 miles per hour (mph) for a site to be acceptable. Recently, the organization conducted wind speed tests at a particular site. Based on a sample of $n = 50$ wind speed recordings (taken at random intervals), the wind speed at the site averaged $\bar{x} = 16.7$ mph, with a standard deviation of $s = 3.6$ mph. To determine whether the site meets the organization's requirements, consider the test, H_0: $\mu \leq 16$ vs. H_a: $\mu > 16$, where μ is the true mean wind speed at the site and $\alpha = .01$. Suppose the value of the test statistic were computed to be 1.37. State the conclusion. 12) _____

A) We are 99% confident that the site does not meet the organization's requirements.
B) At $\alpha = .01$, there is insufficient evidence to conclude the true mean wind speed at the site exceeds 16 mph.
C) We are 99% confident that the site meets the organization's requirements.
D) At $\alpha = .01$, there is sufficient evidence to conclude the true mean wind speed at the site exceeds 16 mph.

13) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of n = 200 cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. Find the large-sample rejection region appropriate for this test if we are using $\alpha = 0.05$. 13) _____

A) Reject H_0 if $z < -1.96$.
B) Reject H_0 if $z < -1.645$ or $z > 1.645$.
C) Reject H_0 if $z > 1.645$.
D) Reject H_0 if $z < -1.96$ or $z > 1.96$.

14) A local eat-in pizza restaurant wants to investigate the possibility of starting to deliver pizzas. The owner of the store has determined that home delivery will be successful only if the average time spent on a delivery does not exceed 38 minutes. The owner has randomly selected 17 customers and delivered pizzas to their homes in order to test whether the mean delivery time actually exceeds 38 minutes. Suppose the p-value for the test was found to be .0288. State the correct conclusion. 14) _____

A) At $\alpha = .05$, we fail to reject H_0.
B) At $\alpha = .025$, we fail to reject H_0.
C) At $\alpha = .03$, we fail to reject H_0.
D) At $\alpha = .02$, we reject H_0.

15) A bottling company produces bottles that hold 10 ounces of liquid. Periodically, the company gets complaints that their bottles are not holding enough liquid. To test this claim, the bottling company randomly samples 16 bottles and finds the average amount of liquid held by the bottles is 9.6 ounces with a standard deviation of .3 ounce. Calculate the appropriate test statistic. 15) _____

A) $t = -21.333$
B) $t = -5.333$
C) $t = -2.921$
D) $t = -5.164$

16) The business college computing center wants to determine the proportion of business students who have laptop computers. If the proportion differs from 35%, then the lab will modify a proposed enlargement of its facilities. Suppose a hypothesis test is conducted and the test statistic is 2.6. Find the p-value for a two-tailed test of hypothesis. 16) _____

A) .0094
B) .4906
C) .0047
D) .4953

17) Eight SmartCars were randomly selected and the highway mileage of each was noted. The highway mileage per gallon for each car is shown below: 17) _____

32 42 29 34 41 37 38 39 40

It was desired to determine if the median miles per gallon of all SmartCars exceeded 35 miles per gallon. Identify the test statistic that should be used when conducting the Sign Test.

A) S = 8 B) S = 2 C) S = 38 D) S = 6

18) A certain manufacturer is interested in evaluating two alternative manufacturing plans consisting of different machine layouts. Because of union rules, hours of operation vary greatly for this particular manufacturer from one day to the next. Twenty-eight random working days were selected and each plan was monitored and the number of items produced each day was recorded. Some of the collected data is shown below: 18) _____

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20) University administrators are trying to decide where to build a new parking garage on campus. The state legislature has budgeted just enough money for one parking structure on campus. The administrators have determined that the parking garage will be built either by the college of engineering or by the college of business. To help make the final decision, the university has randomly and independently asked students from each of the two colleges to estimate how long they usually take to find a parking spot on campus (in minutes). Suppose that the sample sizes selected by the university for the two samples were both $n_e = n_b = 15$. What critical value should be used by the university in the calculations for the 95% confidence interval for $\mu_e - \mu_b$? Assume that the university used the pooled estimate of the population variances in the calculation of the confidence interval. 20) _____

A) z = 1.96 B) z = 1.645 C) t = 1.701 D) t = 2.042 E) t = 2.048

21) A researcher is investigating which of two newly developed automobile engine oils is better at prolonging the life of an engine. Since there are a variety of automobile engines, 20 different engine types were randomly selected and were tested using each of the two engine oils. The number of hours of continuous use before engine breakdown was recorded for each engine oil. Based on the information provided, what type of analysis will yield the most useful information? 21) _____

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C) Matched pairs comparison of population means.
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22) We are interested in comparing the average supermarket prices of two leading colas. Our sample was taken by randomly selecting eight supermarkets and recording the price of a six-pack of each brand of cola at each supermarket. The data are shown in the following table: 22) _____

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4	2.27	2.29	-0.02
5	2.15	2.25	-0.10
6	2.25	2.25	0.00
7	2.36	2.42	-0.06
8	2.37	2.40	-0.03
	$x_1 = 2.3125$	$x_2 = 2.3500$	$d = -0.0375$
	$s_1 = 0.1007$	$s_2 = 0.0859$	$s_d = 0.0381$

Find a 98% confidence interval for the difference in mean price of brand 1 and brand 2.

A) 0.0375 ± 0.0471 B) 0.0375 ± 0.1393 C) 0.0375 ± 0.0347 D) 0.0375 ± 0.0404

23) A paired difference experiment yielded n_d pairs of observations. For the given case, what is the rejection region for testing H_0: $\mu_d \leq 9$ against Ha: $\mu_d > 9$? 23) _____

$n_d = 27$, $\alpha = 0.025$

A) $t > 2.052$ B) $t > 2.056$ C) $t < 2.056$ D) $t < 1.703$

24) Online classes are becoming more and more prevalent at the college level. A statistics instructor randomly sampled ten students from his traditional face-to-face class and ten students from his online class to compare their comprehension of the material that was taught in the class. He administered the same final exam to each student and wants to use the Wilcoxon Rank Sum test to compare their exam scores. The results are shown below: 24) _____

Traditional Class	**Online Class**
82 91 75 68	67 66 72 73
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Calculate the test statistic for the Wilcoxon Rank Sum Test.

A) $T_1 = 60$ B) $T_1 = 44$ C) $T_1 = 76$ D) $T_1 = 120$

25) When blood levels are low at an area hospital, a call goes out to local residents to give blood. The blood center is interested in determining which sex - males or females - is more likely to respond. Random, independent samples of 60 females and 100 males were each asked if they would be willing to give blood when called by a local hospital. A success is defined as a person who responds to the call and donates blood. The goal is to compare the percentage of the successes of the male and female responses. Suppose 45 of the females and 60 of the males responded that they were able to give blood. Find the test statistic that would be used if it is desired to test to determine if a difference exists between the proportion of the females and males who responds to the call to donate blood. 25) _____

A) $z = 1.93$ B) $z = 1.645$ C) $z = 1.96$ D) $z = 2.01$

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

Solve the problem.

1) A 90% confidence interval for the mean percentage of airline reservations being canceled on the day of the flight is (3.1%, 5.3%). What is the point estimator of the mean percentage of reservations that are canceled on the day of the flight? 1) _____

A) 2.2% B) 2.65% C) 4.20% D) 1.10%

2) A retired statistician was interested in determining the average cost of a $200,000.00 term life insurance policy for a 60-year-old male non-smoker. He randomly sampled 65 subjects (60-year-old male non-smokers) and constructed the following 95 percent confidence interval for the mean cost of the term life insurance: ($850.00, $1050.00). What value of alpha was used to create this confidence interval? 2) _____

A) 0.10 B) 0.01 C) 0.05 D) 0.025

3) Find $z_{\alpha/2}$ for the given value of α. 3) _____

$\alpha = 0.14$

A) 1.48 B) 0.14 C) 1.58 D) 1.08

4) Let t_0 be a specific value of t. Find t_0 such that the following statement is true: 4) _____

$P(t \geq t_0) = .01$ where df = 20.

A) 2.539 B) -2.539 C) 2.528 D) -2.528

5) How much money does the average professional football fan spend on food at a single football game? That question was posed to ten randomly selected football fans. The sampled results show that the sample mean and sample standard deviation were $70.00 and $17.50, respectively. Use this information to create a 95 percent confidence interval for the population mean. 5) _____

A) $70 \pm 2.228\left(\frac{17.50}{\sqrt{60}}\right)$ B) $70 \pm 1.960\left(\frac{17.50}{\sqrt{60}}\right)$

C) $70 \pm 2.262\left(\frac{17.50}{\sqrt{60}}\right)$ D) $70 \pm 1.833\left(\frac{17.50}{\sqrt{60}}\right)$

6) A marketing research company is estimating the average total compensation of CEOs in the service industry. Data were randomly collected from 18 CEOs and the 90% confidence interval for the mean was calculated to be ($2,181,260, $5,836,180). What additional assumption is necessary for this confidence interval to be valid? 6) _____

A) The sample standard deviation is less than the degrees of freedom.
B) None. The Central Limit Theorem applies.
C) The distribution of the sample means is approximately normal.
D) The population of total compensations of CEOs in the service industry is approximately normally distributed.

7) A study was conducted to determine what proportion of all college students considered themselves as full-time students. A random sample of 300 college students was selected and 210 of the students responded that they considered themselves full-time students. A computer program was used to generate the following 95% confidence interval for the population proportion: (0.64814, 0.75186). Which of the following practical interpretations is correct for this confidence interval? 7) _____

A) We are 95% confident that the percentage of all college students who consider themselves full-time students was 0.700.

B) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students falls between 0.648 and 0.752.

C) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students was 0.700.

D) We are 95% confident that the percentage of all college students who consider themselves full-time students falls between 0.648 and 0.752.

8) It is desired to estimate the average time it takes Statistics students to finish a computer project to within two hours at 90% reliability. It is estimated that the standard deviation of the times is 14 hours. How large a sample should be taken to get the desired interval? 8) _____

A) $n = 189$ B) $n = 231$ C) $n = 325$ D) $n = 133$

9) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but are now beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. What null and alternative hypothesis should be tested? 9) _____

A) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$ B) $H_0: \mu \leq 215$ vs. $H_A: \mu > 215$

C) $H_0: \mu = 215$ vs. $H_A: \mu \neq 215$ D) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$

10) A significance level for a hypothesis test is given as $\alpha = .05$. Interpret this value. 10) _____

A) The probability of making a Type II error is .95.

B) The probability of making a Type I error is .05.

C) The smallest value of α that you can use and still reject H_0 is .05.

D) There is a 5% chance that the sample will be biased.

Find the rejection region for the specified hypothesis test.

11) Consider a test of $H_0: \mu = 10$. For the following case, give the rejection region for the test in terms of the z-statistic: $H_a: \mu \neq 10$, $\alpha = 0.10$ 11) _____

A) $z > 1.28$ B) $|z| > 1.645$ C) $z > 1.645$ D) $|z| > 1.28$

Solve the problem.

12) A national organization has been working with utilities throughout the nation to find sites for large wind machines that generate electricity. Wind speeds must average more than 23 miles per hour (mph) for a site to be acceptable. Recently, the organization conducted wind speed tests at a particular site. Based on a sample of $n = 43$ wind speed recordings (taken at random intervals), the wind speed at the site averaged $\bar{x} = 24.0$ mph, with a standard deviation of $s = 3.8$ mph. To determine whether the site meets the organization's requirements, consider the test, H_0: $\mu \leq 23$ vs. H_a: $\mu > 23$, where μ is the true mean wind speed at the site and $\alpha = .01$. Suppose the value of the test statistic were computed to be 1.73. State the conclusion. 12) _____

A) We are 99% confident that the site does not meet the organization's requirements.
B) At $\alpha = .01$, there is sufficient evidence to conclude the true mean wind speed at the site exceeds 23 mph.
C) At $\alpha = .01$, there is insufficient evidence to conclude the true mean wind speed at the site exceeds 23 mph.
D) We are 99% confident that the site meets the organization's requirements.

13) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of n = 200 cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. Find the large-sample rejection region appropriate for this test if we are using $\alpha = 0.05$. 13) _____

A) Reject H_0 if $z > 1.645$.
B) Reject H_0 if $z < -1.96$ or $z > 1.96$.
C) Reject H_0 if $z < -1.96$.
D) Reject H_0 if $z < -1.645$ or $z > 1.645$.

14) A local eat-in pizza restaurant wants to investigate the possibility of starting to deliver pizzas. The owner of the store has determined that home delivery will be successful only if the average time spent on a delivery does not exceed 37 minutes. The owner has randomly selected 21 customers and delivered pizzas to their homes in order to test whether the mean delivery time actually exceeds 37 minutes. Suppose the p-value for the test was found to be .0283. State the correct conclusion. 14) _____

A) At $\alpha = .02$, we reject H_0.
B) At $\alpha = .03$, we fail to reject H_0.
C) At $\alpha = .05$, we fail to reject H_0.
D) At $\alpha = .025$, we fail to reject H_0.

15) A bottling company produces bottles that hold 8 ounces of liquid. Periodically, the company gets complaints that their bottles are not holding enough liquid. To test this claim, the bottling company randomly samples 18 bottles and finds the average amount of liquid held by the bottles is 7.7 ounces with a standard deviation of .2 ounce. Calculate the appropriate test statistic. 15) _____

A) $t = -6.185$
B) $t = -2.846$
C) $t = -27.000$
D) $t = -6.364$

16) The business college computing center wants to determine the proportion of business students who have laptop computers. If the proportion differs from 30%, then the lab will modify a proposed enlargement of its facilities. Suppose a hypothesis test is conducted and the test statistic is 2.5. Find the p-value for a two-tailed test of hypothesis. 16) _____

A) .0062
B) .0124
C) .4938
D) .4876

17) Eight SmartCars were randomly selected and the highway mileage of each was noted. The highway mileage per gallon for each car is shown below: 17) _____

32 42 29 34 41 37 38 39 40

It was desired to determine if the median miles per gallon of all SmartCars exceeded 35 miles per gallon. Identify the test statistic that should be used when conducting the Sign Test.

A) S = 2 B) S = 38 C) S = 8 D) S = 6

18) A certain manufacturer is interested in evaluating two alternative manufacturing plans consisting of different machine layouts. Because of union rules, hours of operation vary greatly for this particular manufacturer from one day to the next. Twenty-eight random working days were selected and each plan was monitored and the number of items produced each day was recorded. Some of the collected data is shown below: 18) _____

DAY	PLAN 1 OUTPUT	PLAN 2 OUTPUT
1	1234 units	1311 units
2	1355 units	1366 units
3	1300 units	1289 units

What type of analysis will best allow the manufacturer to determine which plan is more effective?

A) A test of a single population proportion.
B) An independent samples comparison of population means.
C) An independent samples comparison of population proportions.
D) A paired difference comparison of population means.

19) A marketing study was conducted to compare the mean age of male and female purchasers of a certain product. Random and independent samples were selected for both male and female purchasers of the product. What type of analysis should be used to compare the mean age of male and female purchasers? 19) _____

A) A paired difference comparison of population means.
B) A test of a single population mean.
C) An independent samples comparison of population proportions.
D) An independent samples comparison of population means.

20) University administrators are trying to decide where to build a new parking garage on campus. The state legislature has budgeted just enough money for one parking structure on campus. The administrators have determined that the parking garage will be built either by the college of engineering or by the college of business. To help make the final decision, the university has randomly and independently asked students from each of the two colleges to estimate how long they usually take to find a parking spot on campus (in minutes). Suppose that the sample sizes selected by the university for the two samples were both $n_e = n_b = 15$. What critical value should be used by the university in the calculations for the 95% confidence interval for $\mu_e - \mu_b$? Assume that the university used the pooled estimate of the population variances in the calculation of the confidence interval. 20) _____

A) t = 2.042 B) t = 2.048 C) z = 1.645 D) z = 1.96 E) t = 1.701

21) A researcher is investigating which of two newly developed automobile engine oils is better at prolonging the life of an engine. Since there are a variety of automobile engines, 20 different engine types were randomly selected and were tested using each of the two engine oils. The number of hours of continuous use before engine breakdown was recorded for each engine oil. Based on the information provided, what type of analysis will yield the most useful information? 21) _____

A) Matched pairs comparison of population proportions.
B) Independent samples comparison of population proportions.
C) Independent samples comparison of population means.
D) Matched pairs comparison of population means.

22) We are interested in comparing the average supermarket prices of two leading colas. Our sample was taken by randomly selecting eight supermarkets and recording the price of a six-pack of each brand of cola at each supermarket. The data are shown in the following table: 22) _____

	Price		
Supermarket	Brand 1	Brand 2	Difference
1	\$2.25	\$2.30	\$-0.05
2	2.47	2.45	0.02
3	2.38	2.44	-0.06
4	2.27	2.29	-0.02
5	2.15	2.25	-0.10
6	2.25	2.25	0.00
7	2.36	2.42	-0.06
8	2.37	2.40	-0.03
	$x_1 = 2.3125$	$x_2 = 2.3500$	$d = -0.0375$
	$s_1 = 0.1007$	$s_2 = 0.0859$	$s_d = 0.0381$

Find a 98% confidence interval for the difference in mean price of brand 1 and brand 2.

A) 0.0375 ± 0.0347 B) 0.0375 ± 0.1393 C) 0.0375 ± 0.0471 D) 0.0375 ± 0.0404

23) A paired difference experiment yielded n_d pairs of observations. For the given case, what is the rejection region for testing $H_0: \mu_d \leq 9$ against Ha: $\mu_d > 9$? 23) _____

$n_d = 12, \alpha = 0.01$

A) $t > 2.718$ B) $t < 2.718$ C) $t < 3.106$ D) $t > 2.681$

24) Online classes are becoming more and more prevalent at the college level. A statistics instructor randomly sampled ten students from his traditional face-to-face class and ten students from his online class to compare their comprehension of the material that was taught in the class. He administered the same final exam to each student and wants to use the Wilcoxon Rank Sum test to compare their exam scores. The results are shown below: 24) _____

Traditional Class				**Online Class**			
82	91	75	68	67	66	72	73
93	85	74	70	77	76	48	81
56	82			86	92		

Calculate the test statistic for the Wilcoxon Rank Sum Test.

A) $T_1 = 76$ B) $T_1 = 60$ C) $T_1 = 44$ D) $T_1 = 120$

25) When blood levels are low at an area hospital, a call goes out to local residents to give blood. The blood center is interested in determining which sex - males or females - is more likely to respond. Random, independent samples of 60 females and 100 males were each asked if they would be willing to give blood when called by a local hospital. A success is defined as a person who responds to the call and donates blood. The goal is to compare the percentage of the successes of the male and female responses. Suppose 45 of the females and 60 of the males responded that they were able to give blood. Find the test statistic that would be used if it is desired to test to determine if a difference exists between the proportion of the females and males who responds to the call to donate blood. 25) _____

A) $z = 1.93$ B) $z = 2.01$ C) $z = 1.645$ D) $z = 1.96$

Second Exam - Statistics 13
December 5, 2014

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

Solve the problem.

1) A 90% confidence interval for the mean percentage of airline reservations being canceled on the day of the flight is (3.3%, 6.1%). What is the point estimator of the mean percentage of reservations that are canceled on the day of the flight? 1) _____

A) 1.40% B) 4.70% C) 2.8% D) 3.05%

2) A retired statistician was interested in determining the average cost of a $200,000.00 term life insurance policy for a 60-year-old male non-smoker. He randomly sampled 65 subjects (60-year-old male non-smokers) and constructed the following 95 percent confidence interval for the mean cost of the term life insurance: ($850.00, $1050.00). What value of alpha was used to create this confidence interval? 2) _____

A) 0.025 B) 0.05 C) 0.01 D) 0.10

3) Find $z_{\alpha/2}$ for the given value of α. 3) _____

$\alpha = 0.05$

A) 1.645 B) 2.81 C) 1.96 D) 0.33

4) Let t_0 be a specific value of t. Find t_0 such that the following statement is true: 4) _____

$P(t \leq t_0) = .05$ where df = 20.

A) 1.725 B) 1.729 C) -1.725 D) -1.729

5) How much money does the average professional football fan spend on food at a single football game? That question was posed to ten randomly selected football fans. The sampled results show that the sample mean and sample standard deviation were $70.00 and $17.50, respectively. Use this information to create a 95 percent confidence interval for the population mean. 5) _____

A) $70 \pm 2.228\left(\frac{17.50}{\sqrt{60}}\right)$ B) $70 \pm 1.960\left(\frac{17.50}{\sqrt{60}}\right)$

C) $70 \pm 1.833\left(\frac{17.50}{\sqrt{60}}\right)$ D) $70 \pm 2.262\left(\frac{17.50}{\sqrt{60}}\right)$

6) A marketing research company is estimating the average total compensation of CEOs in the service industry. Data were randomly collected from 18 CEOs and the 95% confidence interval for the mean was calculated to be ($2,181,260, $5,836,180). What additional assumption is necessary for this confidence interval to be valid? 6) _____

A) The sample standard deviation is less than the degrees of freedom.
B) The distribution of the sample means is approximately normal.
C) The population of total compensations of CEOs in the service industry is approximately normally distributed.
D) None. The Central Limit Theorem applies.

7) A study was conducted to determine what proportion of all college students considered themselves as full-time students. A random sample of 300 college students was selected and 210 of the students responded that they considered themselves full-time students. A computer program was used to generate the following 95% confidence interval for the population proportion: (0.64814, 0.75186). Which of the following practical interpretations is correct for this confidence interval? 7) _____

A) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students was 0.700.

B) We are 95% confident that the percentage of all college students who consider themselves full-time students was 0.700.

C) We are 95% confident that the percentage of the 300 students who responded that they considered themselves full-time students falls between 0.648 and 0.752.

D) We are 95% confident that the percentage of all college students who consider themselves full-time students falls between 0.648 and 0.752.

8) It is desired to estimate the average time it takes Statistics students to finish a computer project to within two hours at 90% reliability. It is estimated that the standard deviation of the times is 14 hours. How large a sample should be taken to get the desired interval? 8) _____

A) $n = 133$ B) $n = 325$ C) $n = 189$ D) $n = 231$

9) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but are now beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. What null and alternative hypothesis should be tested? 9) _____

A) $H_0: \mu = 215$ vs. $H_A: \mu \neq 215$ B) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$

C) $H_0: \mu \leq 215$ vs. $H_A: \mu > 215$ D) $H_0: \mu \geq 215$ vs. $H_A: \mu < 215$

10) A significance level for a hypothesis test is given as $\alpha = .01$. Interpret this value. 10) _____

A) The probability of making a Type I error is .01.

B) The smallest value of α that you can use and still reject H_0 is .01.

C) The probability of making a Type II error is .99.

D) There is a 1% chance that the sample will be biased.

Find the rejection region for the specified hypothesis test.

11) Consider a test of $H_0: \mu = 12$. For the following case, give the rejection region for the test in terms of the z-statistic: $H_a: \mu \neq 12$, $\alpha = 0.10$ 11) _____

A) $z > 1.645$ B) $z > 1.28$ C) $|z| > 1.28$ D) $|z| > 1.645$

Solve the problem.

12) A national organization has been working with utilities throughout the nation to find sites for large wind machines that generate electricity. Wind speeds must average more than 23 miles per hour (mph) for a site to be acceptable. Recently, the organization conducted wind speed tests at a particular site. Based on a sample of $n = 41$ wind speed recordings (taken at random intervals), the wind speed at the site averaged $\bar{x} = 23.9$ mph, with a standard deviation of $s = 3.7$ mph. To determine whether the site meets the organization's requirements, consider the test, H_0: $\mu \leq 23$ vs. H_a: $\mu > 23$, where μ is the true mean wind speed at the site and $\alpha = .01$. Suppose the value of the test statistic were computed to be 1.56. State the conclusion. 12) _____

A) We are 99% confident that the site meets the organization's requirements.
B) We are 99% confident that the site does not meet the organization's requirements.
C) At $\alpha = .01$, there is insufficient evidence to conclude the true mean wind speed at the site exceeds 23 mph.
D) At $\alpha = .01$, there is sufficient evidence to conclude the true mean wind speed at the site exceeds 23 mph.

13) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was $215.00. A random sample of n = 200 cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than $215.00. Find the large-sample rejection region appropriate for this test if we are using $\alpha = 0.05$. 13) _____

A) Reject H_0 if $z > 1.645$.
B) Reject H_0 if $z < -1.645$ or $z > 1.645$.
C) Reject H_0 if $z < -1.96$.
D) Reject H_0 if $z < -1.96$ or $z > 1.96$.

14) A local eat-in pizza restaurant wants to investigate the possibility of starting to deliver pizzas. The owner of the store has determined that home delivery will be successful only if the average time spent on a delivery does not exceed 34 minutes. The owner has randomly selected 15 customers and delivered pizzas to their homes in order to test whether the mean delivery time actually exceeds 34 minutes. Suppose the p-value for the test was found to be .0271. State the correct conclusion. 14) _____

A) At $\alpha = .03$, we fail to reject H_0.
B) At $\alpha = .02$, we reject H_0.
C) At $\alpha = .025$, we fail to reject H_0.
D) At $\alpha = .05$, we fail to reject H_0.

15) A bottling company produces bottles that hold 8 ounces of liquid. Periodically, the company gets complaints that their bottles are not holding enough liquid. To test this claim, the bottling company randomly samples 21 bottles and finds the average amount of liquid held by the bottles is 7.6 ounces with a standard deviation of .3 ounce. Calculate the appropriate test statistic. 15) _____

A) $t = -5.963$
B) $t = -28.000$
C) $t = -6.110$
D) $t = -3.347$

16) The business college computing center wants to determine the proportion of business students who have laptop computers. If the proportion differs from 25%, then the lab will modify a proposed enlargement of its facilities. Suppose a hypothesis test is conducted and the test statistic is 2.4. Find the p-value for a two-tailed test of hypothesis. 16) _____

A) .4836
B) .0164
C) .0082
D) .4918

17) Eight SmartCars were randomly selected and the highway mileage of each was noted. The highway mileage per gallon for each car is shown below: 17) _____

32 42 29 34 41 37 38 39 40

It was desired to determine if the median miles per gallon of all SmartCars exceeded 35 miles per gallon. Identify the test statistic that should be used when conducting the Sign Test.

A) S = 2 B) S = 6 C) S = 8 D) S = 38

18) A certain manufacturer is interested in evaluating two alternative manufacturing plans consisting of different machine layouts. Because of union rules, hours of operation vary greatly for this particular manufacturer from one day to the next. Twenty-eight random working days were selected and each plan was monitored and the number of items produced each day was recorded. Some of the collected data is shown below: 18) _____

DAY	PLAN 1 OUTPUT	PLAN 2 OUTPUT
1	1234 units	1311 units
2	1355 units	1366 units
3	1300 units	1289 units

What type of analysis will best allow the manufacturer to determine which plan is more effective?

A) An independent samples comparison of population means.
B) An independent samples comparison of population proportions.
C) A paired difference comparison of population means.
D) A test of a single population proportion.

19) A marketing study was conducted to compare the mean age of male and female purchasers of a certain product. Random and independent samples were selected for both male and female purchasers of the product. What type of analysis should be used to compare the mean age of male and female purchasers? 19) _____

A) A test of a single population mean.
B) A paired difference comparison of population means.
C) An independent samples comparison of population proportions.
D) An independent samples comparison of population means.

20) University administrators are trying to decide where to build a new parking garage on campus. The state legislature has budgeted just enough money for one parking structure on campus. The administrators have determined that the parking garage will be built either by the college of engineering or by the college of business. To help make the final decision, the university has randomly and independently asked students from each of the two colleges to estimate how long they usually take to find a parking spot on campus (in minutes). Suppose that the sample sizes selected by the university for the two samples were both $n_e = n_b = 15$. What critical value should be used by the university in the calculations for the 95% confidence interval for $\mu_e - \mu_b$? Assume that the university used the pooled estimate of the population variances in the calculation of the confidence interval. 20) _____

A) t = 2.048 B) t = 2.042 C) z = 1.96 D) t = 1.701 E) z = 1.645

21) A researcher is investigating which of two newly developed automobile engine oils is better at prolonging the life of an engine. Since there are a variety of automobile engines, 20 different engine types were randomly selected and were tested using each of the two engine oils. The number of hours of continuous use before engine breakdown was recorded for each engine oil. Based on the information provided, what type of analysis will yield the most useful information? 21) _____

A) Matched pairs comparison of population means.
B) Independent samples comparison of population means.
C) Matched pairs comparison of population proportions.
D) Independent samples comparison of population proportions.

22) We are interested in comparing the average supermarket prices of two leading colas. Our sample was taken by randomly selecting eight supermarkets and recording the price of a six-pack of each brand of cola at each supermarket. The data are shown in the following table: 22) _____

	Price		
Supermarket	Brand 1	Brand 2	Difference
1	\$2.25	\$2.30	\$-0.05
2	2.47	2.45	0.02
3	2.38	2.44	-0.06
4	2.27	2.29	-0.02
5	2.15	2.25	-0.10
6	2.25	2.25	0.00
7	2.36	2.42	-0.06
8	2.37	2.40	-0.03
	$x_1 = 2.3125$	$x_2 = 2.3500$	$d = -0.0375$
	$s_1 = 0.1007$	$s_2 = 0.0859$	$s_d = 0.0381$

Find a 98% confidence interval for the difference in mean price of brand 1 and brand 2.

A) 0.0375 ± 0.0347 B) 0.0375 ± 0.0471 C) 0.0375 ± 0.1393 D) 0.0375 ± 0.0404

23) A paired difference experiment yielded n_d pairs of observations. For the given case, what is the rejection region for testing H_0: $\mu_d \leq 9$ against Ha: $\mu_d > 9$? 23) _____

$n_d = 8, \alpha = 0.1$

A) $t < 1.415$ B) $t > 1.397$ C) $t < 1.895$ D) $t > 1.415$

24) Online classes are becoming more and more prevalent at the college level. A statistics instructor randomly sampled ten students from his traditional face-to-face class and ten students from his online class to compare their comprehension of the material that was taught in the class. He administered the same final exam to each student and wants to use the Wilcoxon Rank Sum test to compare their exam scores. The results are shown below: 24) _____

Traditional Class				**Online Class**			
82	91	75	68	67	66	72	73
93	85	74	70	77	76	48	81
56	82			86	92		

Calculate the test statistic for the Wilcoxon Rank Sum Test.

A) $T_1 = 60$ B) $T_1 = 120$ C) $T_1 = 44$ D) $T_1 = 76$

25) When blood levels are low at an area hospital, a call goes out to local residents to give blood. The blood center is interested in determining which sex - males or females - is more likely to respond. Random, independent samples of 60 females and 100 males were each asked if they would be willing to give blood when called by a local hospital. A success is defined as a person who responds to the call and donates blood. The goal is to compare the percentage of the successes of the male and female responses. Suppose 45 of the females and 60 of the males responded that they were able to give blood. Find the test statistic that would be used if it is desired to test to determine if a difference exists between the proportion of the females and males who responds to the call to donate blood. 25) _____

A) $z = 1.96$ B) $z = 1.645$ C) $z = 2.01$ D) $z = 1.93$