Final Exam   Review

1) What is the probability that we commit a type one error during the test of the claim that human hip widths have a mean smaller than 17.5 inches conducted at the 5% significance level?

    A) exactly 0.05   B) at least 0.05   C) at most 0.05
    D) less than 0.05   E) Exactly 2.5%   F) None of these

2) If a researcher decides to use a 5% significance level for a hypothesis test instead of a 1% level and he/she keeps everything else the same, what effect will this have on the hypothesis test?

    A) Both the type I and II error rates will increase.
    B) The type I error will decrease, but the type II error will increase.
    C) The type I error will increase, but the type II error will decrease.
    D) Both the type I and II error rates will decrease.

3) A psychologist claims that more than 33 percent of the population suffers from professional problems due to extreme shyness. Assuming that a hypothesis test of has been conducted and that the conclusion is failure to reject the null hypothesis, state the conclusion in nontechnical terms.

    A) There is sufficient evidence to support the claim that the true proportion is less than 33 percent.
    B) There is sufficient evidence to support the claim that the true proportion is greater than 33 percent.
    C) There is not sufficient evidence to support the claim that the true proportion is less than 33 percent.
    D) There is not sufficient evidence to support the claim that the true proportion is greater than 33 percent.

4) A one-sample z-test for a population mean is performed. Suppose that the P-value for the test is 0.01. For what significance levels can the null hypothesis be rejected?

    A) For α = 0.05, 0.10   B) For all values of α smaller than 0.01
    C) For all values of α greater than or equal to 0.01   D) For α = 0.01

5) Fill in the blank: Given that the mean dollar amount spent on groceries by a couple per week is $150 with a standard deviation of $12, ____% of couples spend between $126 and $174 per week on groceries. Assume that distribution of amount spent on groceries bell-shaped ans symmetrical.

    A) 75%   B) 89%   C) 99.7%
    D) 95%   E) 68%   F) None of these

6) A random sample of 4000 U.S. citizens yielded 2250 who are in favor of gun control legislation. A 90% confidence interval was constructed for the true proportion of people who are in favor of gun control. The resulting interval was as follows: [0.543, 0.583]. If the NRA claims that 55% of the public supports gun control legislation, does this interval contradict their claim?

    A) No, because 55% is inside the interval   B) No, because 56.3% is the sample proportion.
    C) Yes, because 33% is outside the interval.   D) Yes, because 67% is outside the interval.

Solve the problem.

7) The weight of corn chips dispensed into a 14-ounce bag by the dispensing machine has been identified as possessing a normal distribution with a mean of 14.5 ounces and a standard deviation of 0.1 ounce. Suppose 400 bags of chips are randomly selected. Find the probability that the mean weight of these 400 bags is less than 14.6 ounces.

    A) approximately 1   B) .1915   C) .6915   D) .3085

8) An entomologist writes an article in a scientific journal which claims that fewer than 8 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is fail to reject the null hypothesis, state the conclusion in nontechnical terms.

    A) There is sufficient evidence to support the claim that the true proportion is less than 8 in ten thousand.
    B) There is not sufficient evidence to support the claim that the true proportion is greater than 8 in ten thousand.
    C) There is not sufficient evidence to support the claim that the true proportion is less than 8 in ten thousand.
    D) There is sufficient evidence to support the claim that the true proportion is greater than 8 in ten thousand.

9) We have created a 99% confidence interval for μ with the result (12, 17). What conclusion will we make if we test $H_0: \mu = 10$ vs. $H_a: \mu \neq 10$ at $\alpha = .01$?

    A) Fail to reject H_a.   B) Support the H_a.
    C) Do not Reject H_0, and do not support H_a.   D) Reject H_0, and support H_a.

10) Suppose we wish to test Ho: $\mu = 21$ vs. Ha: $\mu < 21$. Which of the following possible sample results gives the most evidence to support Ha?

    A) $\bar{x} = 20$, $s = 3$ B) $\bar{x} = 23$, $s = 3$ C) $\bar{x} = 22$, $s = 4$
    D) $\bar{x} = 24$, $s = 6$ E) $\bar{x} = 17$, $s = 7$ F) None of these

11) What is the proper interpretation of $\sigma_{\hat{x}}$ the standard error of X-bar ?

    A) It indicates the likelihood that your p-value causes us to commit the type I error.
    B) It indicates the size of the sample mean.
    C) It indicates how the sample mean varies from sample to sample.
    D) It indicates the location of the average sample mean on the number line.

12) Which of the following statements is true?

1. The confidence interval is a type of point estimate.

2. A sample proportion is an example of a point estimate.

3. The center of a confidence interval is a population parameter.

4. The smaller the margin of error, the narrow the confidence interval.

    A) 1 and 3   B) 3 and 4   C) 1 and 2   D) 2 and 4

13) Which statement best describes the significance level of a hypothesis test?

    A) The probability of rejecting the null hypothesis when the null hypothesis is true.
    B) The probability of rejecting the null hypothesis when the null hypothesis is not true.
    C) The probability of failing to reject the null hypothesis when the null hypothesis is not true.
    D) None of these

14) We have calculated a confidence interval based on a sample of size $n = 100$. Now we want to get a better estimate with a margin of error that is only one-third as large. How large does our new sample need to be?

    A) 900   B) 200   C) 400   D) 50   E) 25

15) How can you reduce the probability of both a type one error and a type two error simultaneously?

    A) Increase the significance level and increase the sample size, n.
    B) Increase the sample size, n, while lowering the significance level.
    C) Reduce the significance level and reduce the variance.
    D) Decrese the sample size and raise the significance level.

16) Suppose that a manufacturer is testing one of its machines to make sure that the machine is producing more than 97% good parts ($H_0: p = 0.97$ and $H_A: p > 0.97$). The test results in a P-value of 0.002. Unknown to the manufacturer, the machine is actually producing 95% good parts. What probably happens as a result of the testing?

    A) They correctly reject H_0.   B) They fail to reject H_0, making a Type II error.
    C) They fail to reject H_0, making a Type I error.   D) They reject H_0, making a Type I error.

17) Suppose a consumer product researcher wanted to find out whether a Sharpie lasted longer than 12 hours. The researcher tested 25 Sharpies and recorded the number of hours each Sharpie wrote before drying up . At the 5% significance level, P-value = 0.06. State your conclusion about the original claim.

    A) Do not reject the null hypothesis; there is not strong enough evidence to suggest that the Sharpies last longer than a mean of 12 hours.
    B) There needs to be more data to determine if the Sharpies last longer than a mean of 12 hours.
    C) Reject the alternative hypothesis; there is strong evidence to suggest that the Sharpies last longer than a mean of 12 hours.
    D) Reject the null hypothesis; there is strong evidence to suggest that the Sharpies last longer than a mean of 12 hours.

18) If we test the claim that the average weight of a boiler hen is less than 25 pounds, what would the type I error be for this test?

    A) Rejecting the idea that the average weight of these hens is less than 25 pounds when it is not true.
    B) Rejecting the idea that the average weight of these hens is greater than or equal to 25 pounds when it is true.
    C) Not supporting the idea that that the average weight of hens is less than 25 pounds when it actually is true that their average weight is less than 25 pounds.
    D) Rejecting the idea that the average weight of these hens is less than or equal to 25 pounds when that idea is in fact true.

19) If the significance level for a hypothesis test is 0.01 and the p-value for the test ends up being 0.034, after forming the appropriate conclusion based on the p-value, which possible error could have be committed?

   A) Since we did not reject the null, we might have committed a type two error.
   B) Since we did not reject the null, we might have committed a type one error.
   C) Since we rejected the null, we might have committed a type one error.
   D) Since we rejected the null, we might have committed a type two error.

20) At one college, GPAs are normally distributed with a mean of 3 and a standard deviation of 0.5. Find the first quartile, Q_1.

   A) 3.375   B) 3.25   C) 3.335   D) 2.665

21) In a poker game there is a 65% chance that you will earn a $50 profit on a certain $10 bet, and there is a 35% chance you will lose your $10 bet. What is the expected value for this bet?

   A) $36   B) $0   C) -$36
   D) $29   E) $32.50   F) None of these

22) A confidence interval was used to estimate the proportion of flights that were delayed. A randomsample of 95 flights generated the following 90% confidence interval: (.04, .08). Based on the interval above, is the sample proportion of delayed flights equal to 7%?

   A) Yes, and we are 95% sure of it   B) No and we are 95% sure of it

   C)   Maybe   D) No, it is equal to 6%

23) The Central Limit Theorem allows us to assume that _____ is approx. normally distributed when the _____ is sufficiently large.

   A) x-bar, standard deviation   B) x, sample size
   C) x, standard deviation   D) x-bar, sample size

24) A company needs to estimate the average total compensation of CEOs in the service industry. Data were randomly collected from 35 CEOs and the 95% CI was calculated to be ($2,256,000, $5,580,000). What assumptions are necessary for this CI to be valid?

   A) None. The Central Limit Theorem applies.
   B) The sample is randomly selected from a population of total compensations that is a t distribution.
   C) The total compensation of CEOs in the service industry is approximately normally distributed.
   D) The distribution of the means is approximately normal.

25) A small private college is interested to determine if less than 20% of their current students live off campus and drive to class. The college decided to take a random sample of 30 of their current students to use in the analysis. Is the sample size of n = 30 large enough to use this inferential procedure?

    A) Yes, since the central limit theorem works whenever proportions are used
    B) Yes, since $np(1-p)$ are greater than or equal to 10
    C) No
    D) Yes, since $n \geq 30$

26) 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). Explain what the phrase "95% confident" means.

    A) 95% of the sample means from similar samples fall within the interval.
    B) 95% of the population values will fall within the interval.
    C) 95% of the similarly constructed intervals would contain the value of the sample mean.
    D) In repeated sampling, 95% of the intervals constructed would contain μ.

27) A 95% confidence interval for the average salary of all CEOs in the electronics industry was constructed using the results of a random survey of 45 CEOs. The interval was ($138,605, $154,610). To make more useful inferences from the data, it is desired to reduce the width of the confidence interval. Which of the following will result in the most reduced interval width ?

    A) Decrease the sample size and increase the confidence level.
    B) Increase the sample size and increase the confidence level.
    C) Decrease the sample size and decrease the confidence level.
    D) Increase the sample size and decrease the confidence level.

28) For a two-tailed test of hypothesis about the mean at the 3% significance level, what is the probability of committing the type one error?

    A) at least 0.03   B) exactly 0.97   C) exactly 0.03
    D) at most 0.03   E) at most 0.97   F) None of these

29) The manager expects about 80% of his apples to exceed the weight requirement for "Grade A" designation. How many apples must he sample to be 95% confident of estimating the true proportion within $\pm 3\%$

    A) 683   B) 23   C) 505   D) 89   E) 19

30) A survey claims that 9 out of 10 doctors (i.e., 90%) recommend brand Z for their patients who have children. To test this claim against the alternative that the actual proportion of doctors who recommend brand Z is more than 90%, a random sample of 100 doctors results in 83 who indicate that they recommend brand Z. What is the test statistic and conclusion for this problem at the 5% level of significance?

    A) 2.33, Reject Ho   B) -2.33, Do not reject Ho   C) -1.83, Do not reject Ho
    D) -1.645, Reject Ho   E) -1.99, Do not reject Ho   F) None of these

31) The area to the left of the test statistic is 0.375.   What is the probability value if this is a two tail test?

A) 0.625   B) 0.750   C) 0.1885   D) 0.375

32) Sales of a new line of athletic footwear are crucial to the success of a company. The company wishes to estimate the average weekly sales of the new footwear to within $200 with 95% reliability. The initial sales indicate that the standard deviation of the weekly sales figures is approximately $1,400. How many weeks of data must be sampled for the company to get the information it desires?

A) 14 weeks   B) 97 weeks   C) 37,648 weeks
D) 189 weeks   E) 9.5   F) None of these

33) A small private college is interested to determine if less than 20% of their current students live off campus and drive to class. The college decided to take a random sample of 108 of their current students to use in the analysis. Is the sample size of n = 108 large enough to use this inferential procedure?

A) Yes, since both np and nq are greater than or equal to 15
B) No, since np or nq are not greater than or equal to 15
C) Yes, since the central limit theorem works whenever proportions are used
D) Yes, since n ≥ 30

34) A confidence interval was used to estimate the proportion of flights that were delayed. A random sample of 42 flights generated the following 95% confidence interval: (.02, .06). Based on the interval above, is the population proportion of delayed flights equal to 3%?

A)   Maybe   B) No, it is equal to 4%

C) Yes, and we are 95% sure of it   D) No and we are 95% sure of it

Answer Key
Testname:

1) C
2) C
3) D
4) C
5) D
6) A
7) A
8) C
9) D
10) E
11) C
12) D
13) A
14) A
15) B
16) D
17) A
18) B
19) A
20) D
21) D
22) D
23) D
24) A
25) C
26) D
27) D
28) C
29) A
30) B
31)
32) D
33) A
34) A