Chapter 9
DISCUSSION 2

In the following multiple-choice questions, please indicate the correct answer.

1. Which of the following would be an appropriate null hypothesis?
    a) The mean of a population is equal to 55.
    b) The mean of a sample is equal to 55.
    c) The mean of a population is greater than 55.
    d) Only (a) and (c) are appropriate.

2.a. Which of the following would be an appropriate null hypothesis?
    a) The population proportion is less than 0.65.
    b) The sample proportion is less than 0.65.
    c) The population proportion is not less than 0.65.
    d) The sample proportion is no less than 0.65.

2.b. Which of the following would be an appropriate alternative hypothesis?
    a) The population proportion is less than 0.65.
    b) The sample proportion is less than 0.65.
    c) The population proportion is not less than 0.65.
    d) The sample proportion is no less than 0.65.

3.a. A Type I error is committed when
    a) you reject a null hypothesis that is true.
    b) you don't reject a null hypothesis that is true.
    c) you reject a null hypothesis that is false.
    d) you don't reject a null hypothesis that is false.

3.b. A Type II error is committed when
    a) you reject a null hypothesis that is true.
    b) you don't reject a null hypothesis that is true.
    c) you reject a null hypothesis that is false.
    d) you don't reject a null hypothesis that is false.

4. If an economist wishes to determine whether there is evidence that mean family income in a community exceeds $50,000
    a) either a one-tail or two-tail test could be used with equivalent results.
    b) a one-tail test should be utilized.
    c) a two-tail test should be utilized.
    d) None of the above.

5. If an economist wishes to determine whether there is evidence that mean family income in a community equals $50,000
    a) either a one-tail or two-tail test could be used with equivalent results.
    b) a one-tail test should be utilized.
    c) a two-tail test should be utilized.
    d) None of the above.

6. If the *p*-value is less than in a two-tail test, α

a) the null hypothesis should not be rejected.
b) the null hypothesis should be rejected.
c) a one-tail test should be used.
d) no conclusion should be reached.

7. The symbol for the level of significance of a statistical test is

a) α
b) $1 - \alpha$
c) β
d) $1 - \beta$

Use the following details for answering questions 8-12:

How many tissues should the Kimberly Clark Corporation package of Kleenex contain? Researchers determined that 60 tissues is the mean number of tissues used during a cold. Suppose a random sample of 100 Kleenex users yielded the following data on the number of tissues used during a cold: *X-bar* = 52, *S* = 22.

8. Give the null and alternative hypotheses to determine if the number of tissues used during a cold is less than 60.

a) $H_0 : \mu \leq 60$ and $H_1 : \mu > 60$.
b) $H_0 : \mu \geq 60$ and $H_1 : \mu < 60$.
c) $H_0 : X\text{-}bar \geq 60$ and $H_1 : X\text{-}bar < 60$.
d) $H_0 : X\text{-}bar = 52$ and $H_1 : X\text{-}bar \neq 52$.

9. Using the sample information provided, calculate the value of the test statistic.

a) $t = (52 - 60)/\ 22$
b) $t = (52 - 60)\ /\ (22\ /100)$
c) $t = (52 - 60)\ /\ (22\ /100^2)$
d) $t = (52 - 60)\ /\ (22\ /10)$

10. Suppose the alternative you wanted to test was $H_1 : \mu < 60$. State the correct rejection region for $\alpha = 0.05$.

a) Reject H_0 if $t > 1.6604$.
b) Reject H_0 if $t < -1.6604$.
c) Reject H_0 if $t > 1.9842$ or $Z < -1.9842$.
d) Reject H_0 if $t < -1.9842$.

11. Suppose the test statistic does fall in the rejection region at $\alpha = 0.05$. Which of the following decision is correct?

a) At $\alpha = 0.05$, you do not reject H_0.
b) At $\alpha = 0.05$, you reject H_0.
c) At $\alpha = 0.10$, you reject H_0.
d) At $\alpha = 0.10$, you do not reject H_0.

12. Suppose the test statistic does fall in the rejection region at $\alpha = 0.05$. Which of the following conclusion is correct?

a) At $\alpha = 0.05$, there is not sufficient evidence to conclude that the mean number of tissues used during a cold is less than 60 tissues.
b) At $\alpha = 0.05$, there is sufficient evidence to conclude that the mean number of tissues used during a cold is less than 60 tissues.
c) At $\alpha = 0.10$, there is insufficient evidence to conclude that the mean number of tissues used during a cold is less than 60 tissues.
d) At $\alpha = 0.10$, there is sufficient evidence to conclude that the mean number of tissues used during a cold is not less than 60 tissues.

13. You have created a 95% confidence interval for μ with the result $10 \leq \mu \leq 15$. What decision will you make if you test $H_0: \mu = 16$ versus $H_1: \mu \neq 16$ at $\alpha = 0.05$?

a) Reject H_0 in favor of H_1.
b) Do not reject H_0 in favor of H_1.
c) Fail to reject H_0 in favor of H_1.
d) We cannot tell what our decision will be from the information given.

14. An entrepreneur is considering the purchase of a coin-operated laundry. The current owner claims that over the past 5 years, the mean daily revenue was $675 with a population standard deviation of $75. A sample of 50 days reveals a daily mean revenue of $625. If you were to test the null hypothesis that the daily mean revenue was $675, which test would you use?

a) *Z*-test of a population mean
b) *Z*-test of a population proportion
c) *t*-test of population mean
d) *t*-test of a population proportion

15. A manager of the credit department for an oil company would like to determine whether the mean monthly balance of credit card holders is equal to $75. An auditor selects a random sample of 100 accounts and finds that the mean owed is $83.40 with a sample standard deviation of $23.65. If you were to conduct a test to determine whether the auditor should conclude that there is evidence that the mean balance is different from $75, which test would you use?

a) *Z*-test of a population mean
b) *Z*-test of a population proportion
c) *t*-test of population mean
d) *t*-test of a population proportion

16. A survey claims that 9 out of 10 doctors recommend aspirin for their patients with headaches. To test this claim against the alternative that the actual proportion of doctors who recommend aspirin is less than 0.90, a random sample of 100 doctors results in 83 who indicate that they recommend aspirin. The value of the test statistic in this problem is approximately equal to:

a) – 4.12
b) – 2.33
c) – 1.86
d) – 0.07

17. A survey claims that 9 out of 10 doctors recommend aspirin for their patients with headaches. To test this claim against the alternative that the actual proportion of doctors who recommend aspirin is less than 0.90, a random sample of 100 doctors was selected. Suppose that the test statistic is – 2.20. Can you conclude that H_0 should be rejected at the (a) $\alpha = 0.10$, (b) $\alpha = 0.05$, and (c) $\alpha = 0.01$ level of Type I error?

a) (a) yes; (b) yes; (c) yes
b) (a) no; (b) no; (c) no
c) (a) no; (b) no; (c) yes
d) (a) yes; (b) yes; (c) no

18. A survey claims that 9 out of 10 doctors recommend aspirin for their patients with headaches. To test this claim against the alternative that the actual proportion of doctors who recommend aspirin is less than 0.90, a random sample of 100 doctors was selected. Suppose you reject the null hypothesis. What conclusion can you reach?

a) There is not sufficient evidence that the proportion of doctors who recommend aspirin is not less than 0.90.
b) There is sufficient evidence that the proportion of doctors who recommend aspirin is not less than 0.90.
c) There is not sufficient evidence that the proportion of doctors who recommend aspirin is less than 0.90.
d) There is sufficient evidence that the proportion of doctors who recommend aspirin is less than 0.90.

Use the following details for answering questions 19-23:

A pizza chain is considering opening a new store in an area that currently does not have any such stores. The chain will open if there is evidence that more than 5,000 of the 20,000 households in the area have a favorable view of its chain. It conducts a telephone poll of 300 randomly selected households in the area and finds that 96 have a favorable view.

19. State the test of hypothesis that is of interest to the pizza chain.

a) $H_0: \pi \leq 0.32$ versus $H_1: \pi > 0.32$
b) $H_0: \pi \leq 0.25$ versus $H_1: \pi > 0.25$
c) $H_0: \pi \leq 5{,}000$ versus $H_1: \pi > 5{,}000$
d) $H_0: \mu \leq 5{,}000$ versus $H_1: \mu > 5{,}000$

20. The value of the test statistic in this problem is approximately equal to:

a) 2.80
b) 2.60
c) 1.94
d) 1.30

21. The *p*-value associated with the test statistic in this problem is approximately equal to:

a) 0.0100
b) 0.0051
c) 0.0026
d) 0.0013

22. The decision on the hypothesis test using a 5% level of significance is:

a) to reject H_0 in favor of H_1.

b) to accept H_0 in favor of H_1.

c) to fail to reject H_0 in favor of H_1.

d) we cannot tell what the decision should be from the information given.

23. The pizza chain's conclusion from the hypothesis test using a 5% level of significance is:

a) to open a new store.

b) not to open a new store.

c) to delay opening a new store until additional evidence is collected.

d) we cannot tell what the decision should be from the information given.