

Chapter 10 DISCUSSION 3

1. If we are testing for the difference between the means of 2 independent populations presuming equal variances with samples of $n_1 = 20$ and $n_2 = 20$, the number of degrees of freedom is equal to

- a) 39.
- b) 38.
- c) 19.
- d) 18.

2. In testing for differences between the means of two independent populations, the null hypothesis is:

- a) $H_0: \mu_1 - \mu_2 = 2$.
- b) $H_0: \mu_1 - \mu_2 = 0$.
- c) $H_0: \mu_1 - \mu_2 > 0$.
- d) $H_0: \mu_1 - \mu_2 < 0$.

Use the following information for answering questions 3 to 9:

Is there a difference between the motivational levels of Japanese managers and American managers? A randomly selected group of each were administered the Sarnoff Survey of Attitudes Toward Life (SSATL), which measures motivation for upward mobility. The SSATL scores are summarized below:

	American	Japanese
Sample Size	211	100
Sample Mean SSATL Score	65.75	79.83
Sample Std. Dev.	11.07	6.41

3. Judging from the way the data were collected, which test would likely be most appropriate to employ?

- a) Paired t test
- b) Pooled-variance t test for the difference between two means
- c) F test for the ratio of two variances
- d) Z test for the difference between two proportions

4. Give the null and alternative hypotheses to determine if the mean SSATL score of Japanese managers differs from the mean SSATL score of American managers.

- a) $H_0: \mu_A - \mu_J \geq 0$ versus $H_1: \mu_A - \mu_J < 0$
- b) $H_0: \mu_A - \mu_J \leq 0$ versus $H_1: \mu_A - \mu_J > 0$
- c) $H_0: \mu_A - \mu_J = 0$ versus $H_1: \mu_A - \mu_J \neq 0$
- d) $H_0: \bar{X}_{A-J} = 0$ versus $H_1: \bar{X}_{A-J} \neq 0$

5. What is the value of the test statistic?

- a) -14.08
- b) -11.8092
- c) -1.9677
- d) 96.4471

6. What is the degrees of freedom?
- 311
 - 209
 - 2
 - None of the above
7. What is the critical t value at the 1% level of significance (assuming ∞ degrees of freedom)?
- ± 2.5758
 - ± 6745
 - -2.5758
 - 2.5758
8. What is the decision at the 1% level of significance?
- Reject the null hypothesis and conclude the means are different.
 - Reject the null hypothesis and conclude the means are the same.
 - Fail to reject the null hypothesis and conclude the means are the same.
 - Fail to reject the null hypothesis and conclude the means are different.
9. If the calculated value of t is $+1.70$, what would be the decision using the 0.01 level of significance?
- Reject the null hypothesis and conclude the means are different.
 - Reject the null hypothesis and conclude the means are the same.
 - Fail to reject the null hypothesis and conclude the means are the same.
 - Fail to reject the null hypothesis and conclude the means are different.

Use the following information for answering questions 10 to 13:

A researcher randomly sampled 30 graduates of an MBA program and recorded data concerning their starting salaries. Of primary interest to the researcher was the effect of gender on starting salaries. The result of the pooled-variance t -test of the mean salaries of the females (Population 1) and males (Population 2) in the sample is given below:

Hypothesized Difference	0
Level of Significance	0.05
Population 1 Sample (Females)	
Sample Size	18
Sample Mean	99210
Sample Standard Deviation	13577
Population 2 Sample (Males)	
Sample Size	12
Sample Mean	105820
Sample Standard Deviation	11741
Test Results	
Difference in Sample Means	-6610
t Test Statistic	-1.37631
Lower-Tail Test	
Lower Critical Value	-1.70113
p-Value	0.089816

10. The researcher was attempting to show statistically that the female MBA graduates have a significantly lower mean starting salary than the male MBA graduates. Which of the following is an appropriate alternative hypothesis?

- a) $H_1 : \mu_{\text{females}} > \mu_{\text{males}}$
- b) $H_1 : \mu_{\text{females}} < \mu_{\text{males}}$
- c) $H_1 : \mu_{\text{females}} \neq \mu_{\text{males}}$
- d) $H_1 : \mu_{\text{females}} = \mu_{\text{males}}$

11. The researcher was attempting to show statistically that the female MBA graduates have a significantly lower mean starting salary than the male MBA graduates. From the analysis, the correct test statistic is:

- a) -6610
- b) -1.3763
- c) -1.7011
- d) 0.0898

12. The proper conclusion for this test is:

- a) At the $\alpha = 0.05$ level, fail to reject the null hypothesis and conclude that the female MBA graduates have a significantly lower mean starting salary than the male MBA graduates.
- b) At the $\alpha = 0.05$ level, reject the null hypothesis and conclude that there is sufficient evidence to indicate that females have a lower mean starting salary than male MBA graduates.
- c) At the $\alpha = 0.05$ level, reject the null hypothesis and conclude that there is sufficient evidence to indicate that females have a higher mean starting salary than male MBA graduates.
- d) At the $\alpha = 0.05$ level, fail to reject the null hypothesis and conclude that there is insufficient evidence to indicate any difference in the mean starting salaries of male and female MBA graduates.

13. What assumptions were necessary to conduct this hypothesis test?

- a) Both populations of salaries (male and female) must have approximate normal distributions.
- b) The population variances are approximately equal.
- c) The samples were randomly and independently selected.
- d) All of the above assumptions were necessary.

Use the following information for answering questions 14 to 18:

Two samples each of size 25 are taken from independent populations assumed to be normally distributed with equal variances. The first sample has a mean of 35.5 and standard deviation of 3.0 while the second sample has a mean of 33.0 and standard deviation of 4.0.

14. The pooled (i.e., combined) variance is _____.

15. The computed t statistic is _____.

16. There are _____ degrees of freedom for this test.

17. The critical values for a two-tail test of the null hypothesis of no difference in the population means at the $\alpha = 0.05$ level of significance are _____.

18. A two-tail test of the null hypothesis of no difference would _____ (be rejected/not be rejected) at the $\alpha = 0.05$ level of significance.

Use the following information for answering questions 19 to 24:

To test the effectiveness of a business school preparation course, 8 students took a general business test before and after the course. The results are given below:

<u>Student</u>	<u>Exam Score Before Course (1)</u>	<u>Exam Score After Course (2)</u>
1	530	670
2	690	770
3	910	1,000
4	700	710
5	450	550
6	820	870
7	820	770
8	630	610

19. The number of degrees of freedom is

- a) 14.
- b) 13.
- c) 8.
- d) 7.

20. The value of the sample mean difference is _____ if the difference scores reflect the results of the exam after the course minus the results of the exam before the course.

- a) 0
- b) 50
- c) 68
- d) 400

21. What is the critical value for testing at the 5% level of significance whether the business school preparation course is effective (increases) in improving exam scores?

- a) 2.3060
- b) 2.8965
- c) 1.7610
- d) 1.8946

22. What is the value of calculated t ?

- a) 0
- b) 2.175
- c) 1.8946
- d) 50

23. At the 0.05 level of significance, the decision for this hypothesis test would be:

- a) reject the null hypothesis.
- b) do not reject the null hypothesis.
- c) reject the alternative hypothesis.
- d) It cannot be determined from the information given.

24. At the 0.05 level of significance, the conclusion for this hypothesis test is that there is sufficient evidence that:

- a) the business school preparation course does improve exam score.
- b) the business school preparation course does not improve exam score.
- c) the business school preparation course has no impact on exam score.
- d) no conclusion can be drawn from the information given.

Use the following information for answering questions 25 to 28:

One question asked of both men and women was: “what do you buy from your mobile device? 24% of the men compared to 62% of the women responded “we buy clothes” Suppose that 150 women and 200 men were interviewed. Assume W designates women’s responses and M designates men’s.

25. What hypothesis should test in order to show that is there difference between the women and the men who said they buy clothing from their mobile device?

- a) $H_0: \pi_w - \pi_M \geq 0$ versus $H_1: \pi_w - \pi_M < 0$
- b) $H_0: \pi_w - \pi_M \leq 0$ versus $H_1: \pi_w - \pi_M > 0$
- c) $H_0: \pi_w - \pi_M = 0$ versus $H_1: \pi_w - \pi_M \neq 0$
- d) $H_0: \pi_w - \pi_M \neq 0$ versus $H_1: \pi_w - \pi_M = 0$

26. For a 0.01 level of significance, what is the critical value for the rejection region?

- a) 7.062
- b) 7.106
- c) 6.635
- d) 2.33

27. What is the value of the test statistic?

- a) 7.062
- b) 7.106
- c) 6.635
- d) 2.33

28. What conclusion should be reached?

- a) Using a 0.01 level of significance, there is sufficient evidence to conclude that women buy clothes than men.
- b) There is insufficient evidence to conclude with at least 99% confidence that conclude that women buy clothes than do men.
- c) There is no evidence of a significant difference between the men and women at a 0.01 level of significance.
- d) More information is needed to draw any conclusions from the data set.

ANSWER: a

Use the following information for answering questions 29 to 32:

The use of preservatives by food processors has become a controversial issue. Suppose two preservatives are extensively tested and determined safe for use in meat. A processor wants to compare the preservatives for their effects on retarding spoilage. Suppose 15 cuts of fresh meat are treated with preservative I and 15 are treated with preservative II, and the number of hours until spoilage begins is recorded for each of the 30 cuts of meat. The results are summarized in the table below:

Preservative I

$$\bar{X}_I = 106.4 \text{ hours}$$

$$S_I = 10.3 \text{ hours}$$

Preservative II

$$\bar{X}_{II} = 96.54 \text{ hours}$$

$$S_{II} = 13.4 \text{ hours}$$

29. State the null and alternative hypotheses for testing if the population variances differ for preservatives I and II.

- a) $H_0 : \sigma_I^2 - \sigma_{II}^2 \geq 0$ versus $H_1 : \sigma_I^2 - \sigma_{II}^2 < 0$
- b) $H_0 : \sigma_I^2 - \sigma_{II}^2 \leq 0$ versus $H_1 : \sigma_I^2 - \sigma_{II}^2 > 0$
- c) $H_0 : \sigma_I^2 - \sigma_{II}^2 = 0$ versus $H_1 : \sigma_I^2 - \sigma_{II}^2 \neq 0$
- d) $H_0 : \sigma_I^2 - \sigma_{II}^2 \neq 0$ versus $H_1 : \sigma_I^2 - \sigma_{II}^2 = 0$

30. What is the value of the test statistic for testing if the population variances differ for preservatives I and II?

31. Suppose $\alpha = 0.05$ and the critical value is 2.95, which of the following represents the result of the relevant hypothesis test?

- a) The alternative hypothesis is not rejected.
- b) The null hypothesis is rejected.
- c) The null hypothesis is not rejected.
- d) Insufficient information exists on which to make a decision.

32. Suppose $\alpha = 0.05$. Which of the following represents the correct conclusion?

- a) There is no evidence of a difference in the population variances between preservatives I and II.
- b) There is evidence of a difference in the population variances between preservatives I and II.
- c) There is no evidence that the population variances between preservatives I and II are the same.
- d) There is evidence that the population variances between preservatives I and II are the same.

33. In a one-way ANOVA, the null hypothesis is always

- a) there is no difference in the population means.
- b) there is some treatment effect.
- c) all the population means are different.
- d) some of the population means are different.

Use the following information for answering questions 34 to 37:

An airline wants to select a computer software package for its reservation system. Four software packages (1, 2, 3, and 4) are commercially available. The airline will choose the package that bumps as few passengers as possible during a month. An experiment is set up in which each package is used to make reservations. A total of 20 weeks was included in the experiment. The number of passengers bumped each week is obtained, which gives rise to the following ANOVA Table:

ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	212.4	3		8.304985	0.001474	3.238867
Within Groups	136.4		8.525			
Total	348.8					

34. The Within Groups degrees of freedom is
- a) 3
 - b) 4
 - c) 16
 - d) 19
35. The total degrees of freedom is
- a) 3
 - b) 4
 - c) 16
 - d) 19
36. The among-group (between-group) mean squares is
- a) 8.525
 - b) 70.8
 - c) 212.4
 - d) 637.2
37. At a significance level of 1%,
- a) there is insufficient evidence to conclude that the mean number of customers bumped by the 4 packages are not all the same.
 - b) there is insufficient evidence to conclude that the mean number of customers bumped by the 4 packages are all the same.
 - c) there is sufficient evidence to conclude that the mean number of customers bumped by the 4 packages are not all the same.
 - d) there is sufficient evidence to conclude that the mean number of customers bumped by the 4 packages are all the same.