

Quiz #2 Practice Questions (Modules 3 & 4)

Note: Answer key is on page 2 of this document. The actual quiz questions will be in multiple-choice format. These practice questions are meant to familiarize you with the wording of the actual quiz questions and the type of concepts covered in the quiz.

1. Which test is performed by SPSS to check the assumption for a between-subjects one-way ANOVA but not for a repeated-measures one-way ANOVA?
2. A data set that can be analyzed with a paired-samples t test can also be analyzed with a ____ ANOVA.
3. The following output table from a one-way ANOVA and the DV of Technology Dependence score. Based on the ANOVA result below, answer the following questions, assuming an alpha level of .05.

Test of Homogeneity of Variances			
Tech dependence			
Levene Statistic	df1	df2	Sig.
.622	3	36	.606

ANOVA					
Tech dependence					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	79.829	3	26.610	3.104	.039
Within Groups	308.571	36	8.571		
Total	388.400	39			

Post Hoc Tests							
Multiple Comparisons							
Dependent Variable: Tech dependence							
	(I) Class	(J) Class	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
LSD	1.0	2.0	-3.1429*	1.1518	.010	-5.479	-.807
		3.0	-2.0000	1.3553	.149	-4.749	.749
		4.0	-3.1429*	1.3553	.026	-5.891	-.394
	2.0	1.0	3.1429*	1.1518	.010	.807	5.479
		3.0	1.1429	1.3924	.417	-1.681	3.967
		4.0	.0000	1.3924	1.000	-2.824	2.824
	3.0	1.0	2.0000	1.3553	.149	-.749	4.749
		2.0	-1.1429	1.3924	.417	-3.967	1.681
		4.0	-1.1429	1.5649	.470	-4.317	2.031
	4.0	1.0	3.1429*	1.3553	.026	.394	5.891
		2.0	.0000	1.3924	1.000	-2.824	2.824
		3.0	1.1429	1.5649	.470	-2.031	4.317
Tamhane	1.0	2.0	-3.1429	1.1965	.086	-6.573	.287
		3.0	-2.0000	1.0202	.331	-4.994	.994
		4.0	-3.1429	1.5496	.338	-8.057	1.771
	2.0	1.0	3.1429	1.1965	.086	-.287	6.573
		3.0	1.1429	1.0015	.848	-1.840	4.125
		4.0	.0000	1.5374	1.000	-4.912	4.912
	3.0	1.0	2.0000	1.0202	.331	-.994	4.994
		2.0	-1.1429	1.0015	.848	-4.125	1.840
		4.0	-1.1429	1.4046	.969	-5.985	3.699
	4.0	1.0	3.1429	1.5496	.338	-1.771	8.057
		2.0	.0000	1.5374	1.000	-4.912	4.912
		3.0	1.1429	1.4046	.969	-3.699	5.985

*. The mean difference is significant at the 0.05 level.

- 3A. How many groups were compared?

3B. What can be determined regarding the assumption of homogeneity of variances across the groups?

3C. What is the decision regarding hypothesis testing (can we reject the null hypothesis)?

3D. Report the ANOVA result in APA format.

3E. Which groups were significantly different from which groups?

4. A college professor would like to examine the SAT scores of applicants straight out of high school and those who are coming back to college after some work experience. The professor is also interested in any potential gender differences in the SAT scores. What type of ANOVA can be performed to answer the research questions?

5. According to the SPSS output below, post-hoc tests should be performed for which factor?

Tests of Between-Subjects Effects						
Dependent Variable: GPA Improvement						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.557 ^a	5	1.511	49.675	.000	.515
Intercept	19.723	1	19.723	648.189	.000	.735
location	4.696	2	2.348	77.173	.000	.397
gender	.081	1	.081	2.651	.105	.011
location * gender	2.780	2	1.390	45.688	.000	.281
Error	7.120	234	.030			
Total	34.400	240				
Corrected Total	14.677	239				

a. R Squared = .515 (Adjusted R Squared = .505)

6. If the one-way repeated-measures ANOVA is significant for comparing three sets of scores collected from the same subjects, what follow-up tests should be performed?

Answer Key

1. Levene's test

Levene's test examines homogeneity of variances when there are groups drawn from different populations. In the repeated-measures test, the groups being compared are drawn from the same population so there is no need to conduct Levene's test.

2. One-way repeated-measures

Paired-samples t test and one-way repeated-measures ANOVA both are designed to compare scores collected from the same subjects or samples that are related. The ANOVA option can handle 2 or more groups while the t test option can only handle 2 groups.

3A. 4 groups

The between-group df is 3. df is N-1, so N would be 4. Between-group N refers to the number of groups.

3B. We can assume homogeneity of variances across the groups being compared because the Levene's test was not significant. Levene's test examines the null hypothesis that the variances from the groups are equal (or not different). When p is larger than alpha, we fail to reject the null hypothesis and we can assume the variances to be equal.

3C. We can reject the null hypothesis because p is lower than alpha (.05).

3D. $F(3, 36) = 3.104, p = .039$

3E. Group 1 is significantly different from group 2 and group 4.

4. Two-way (factorial) ANOVA, because there are two grouping factors: years after graduation and gender.

5. Location factor.

There are two factors in this analysis: location and gender. Only the p value for location is lower than alpha, which indicates that there's a significant difference among the different locations and we need to find out which location is significantly different from which location in terms of GPA improvement.

6. Within-subjects contrasts.

Tests of within-subjects contrasts are performed to examine a significant within-subjects factor while post-hoc tests are performed to examine a significant between-subjects factor.