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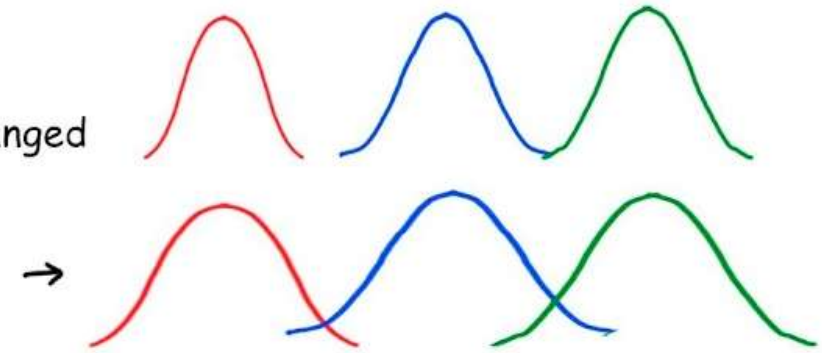
Problem Set – Lesson 12

Q1.

As the variability within treatment groups increases, the likelihood of rejecting the null hypothesis _____.

- decreases
- increases
- remains unchanged



Q2.

In ANOVA, the differences between treatment groups (between-group variances) contributes to _____.

- the denominator of the F-ratio
- the numerator of the F-ratio
- both the numerator and the denominator of the F-ratio.
- no part of the F-ratio.

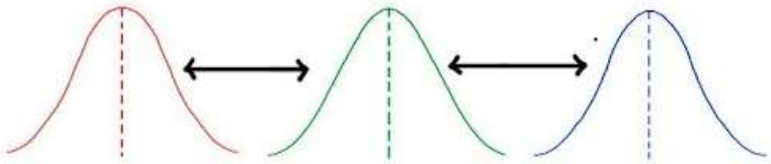
Q3

Which of the following is not a potential source of variation within a treatment group?

- individual differences
- experimental error
- ambiguous survey questions
- treatment effects

Q4.

As the variability between treatment groups gets larger and larger (assuming the within-group variability remains relatively constant), the likelihood of rejecting the null hypothesis _____.



- increases
- decreases
- remains unchanged

Q5.

True False

- ☐ If the null hypothesis is true, then on average the F-ratio for ANOVA is expected to have a value near 1.00.
- ☐ One of the great advantages of ANOVA is that it allows researchers to compare more than two treatment conditions without having to conduct multiple hypothesis tests (for instance, t-tests).

Q6.

Which combinations of factors is most likely to produce a large F value?

- large mean differences and large within-group variability
- large mean differences and small within-group variability
- small mean differences and large within-group variability
- small mean differences and small within-group variability

Q7.

An analysis of variance is used to evaluate the mean differences for a research study comparing four treatments with independent samples of participants of n = 10 in each treatment group. For this analysis, what are the degrees of freedom between and within (dfbetween, dfwithin)?

- 4, 40
- 3, 37
- 4, 36
- 3, 36

Q8.

If the previously mentioned ANOVA (that is, four treatment groups each with 10 participants) produce an F-ratio of F = 3.96, then which of the following is the correct statistical decision?

- Reject the null hypothesis at both alpha = .05 or alpha = .01.
- Retain the null hypothesis at both alpha = .05 or alpha = .01.
- Retain the null hypothesis at alpha = .05 but reject the null at alpha = .01.
- Reject the null hypothesis at alpha = .05 but not at alpha = .01.

Q9.

An analysis of variance is used to evaluate the mean differences for a research study comparing four treatments with independent samples of participants of n = 3 in each treatment group. For this analysis, what are the degrees of freedom between and within (dfbetween, dfwithin)?

- 4, 12
- 4, 8
- 3, 12
- 3, 8

Q10.

If the previously mentioned ANOVA (that is, four treatment groups each with 3 participants) produce an F-ratio of F = 3.96, then which of the following is the correct statistical decision?

- Reject the null hypothesis at both alpha = .05 or alpha = .01.
- Retain the null hypothesis at both alpha = .05 or alpha = .01.
- Retain the null hypothesis at alpha = .05 but reject the null at alpha = .01.
- Reject the null hypothesis at alpha = .05 but not at alpha = .01.

Prob 11-19

First-born children tend to develop language skills faster than their younger siblings. One possible explanation for this phenomenon is that first-borns' have the undivided attention from their parents. If this explanation is correct, then it is reasonable that twins should show slower language development than single children and that triplets should be even slower. The following data were obtained from several families. The dependent variable (data) is a measure of language skill at age three for each child. The higher the score, the better the language skill.

Q11.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

Which of the following represents the null hypothesis (check all that apply)?

- $\mu 1 \neq \mu 2 \neq \mu 3$
- $\mu 1 \neq \mu 2 = \mu 3$
- $\mu 1 = \mu 2 \neq \mu 3$
- $\mu 1 = \mu 2 = \mu 3$

Q12.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

The alternative hypothesis includes which of the following (check all that apply)?

- $\mu 1 \neq \mu 2 \neq \mu 3$
- $\mu 1 \neq \mu 2 = \mu 3$
- $\mu 1 = \mu 2 \neq \mu 3$
- $\mu 1 = \mu 2 = \mu 3$

Q13.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

What is the sum of squares for between-groups?

Q14.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

What is the sum of squares for within-groups?

Q15.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

dfbetween =
dfwithin =

Q16.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

MS between =
MS within =

Q17.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

F =

Q18.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

What is the F critical value at alpha = .05?

Q19.

Single Child	Twin	Triplet
8	4	4
7	6	4
10	7	7
6	4	2
9	9	3

What is your statistical decision?

- Reject the null
- Retain the null

Q20.

An analysis of variances produces dfbetween = 2 and dfwithin = 24. For this analysis, what is dftotal?

- 27
- 26
- 24
- 12
- There is not enough information to compute this value

Q21.

In a study examining the effects of noise on memory performance, the null hypothesis would state that:

- noise will not affect memory performance
- noise will impair memory performance
- noise will improve memory performance
- memory performance causes changes in noise

Q22.

A researcher reported F(3, 24) = 5.30 for a one-way ANOVA. How many individuals participated in the entire experiment?

- 24
- 27
- 28
- 5.30

Q23.

A researcher computed an F-ratio of -4.35, with df = (3, 25)? What decision should the researcher make with respect to the null hypothesis, if a = .05?

- Reject
- Retain
- Cannot make a decision because F cannot be negative

Q24.

An analysis of variance produces SStotal = 200 and SSwithin = 50. For this analysis, what is SSbetween?

- 150
- 250
- 4
- 0.25

Q25.

For the ANOVA F test, the smaller the MSwithin, the greater the likelihood that you will reject the null hypothesis.

- True
- False