GÖTEBORGS UNIVERSITET

STUDENT

0002-FKA

TENTAMEN

TIG109 Tentamen

Kurskod	--
Bedömningsform	DT
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TIG109: Metod 2 och projekt, 15 hp, VT 2024

Delkurs 2: Statistisk analys av data, 6 hp

TENTAMEN

Frågorna är av typerna: ett korrekt svarsalternativ bland fyra möjliga, flera korrekta svarsalternativ, skriva siffror, och sant/falskt. Frågorna är formulerade på engelska.

Maxpoäng är 38, gränsen för **Godkänt** är 22 och för **Väl godkänt** 33 poäng.

Tillåtet hjälpmedel: tryckt engelskt lexikon (utan anteckningar)

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Multiple-choice questions

Please choose the best alternative.

1   The score appearing in the middle of a distribution is called the
    Välj ett alternativ:

    ○ mean.

    ◉ median. ✅

    ○ mode.

    ○ standard deviation.

    Rätt. 1 av 1 poäng.

2 What are the recommended steps when data collection for an experiment is complete?

Välj ett alternativ:

○ First establishing effects using statistical tests, then summarizing the data, and last checking data for errors and outliers.

○ First checking data for errors and outliers, then summarizing the data, and last establishing effects using statistical tests, followed by removing outliers if results are not statistically significant.

○ First checking data for errors and outliers, then summarizing the data, and last establishing effects using statistical tests. ✅

○ First summarizing the data, then checking data for errors and outliers, and last establishing effects using statistical tests.

Rätt. 1 av 1 poäng.

3 Which of the following is not a measure of central tendency?

Välj ett alternativ:

○ median

○ range ✅

○ mean

○ mode

Rätt. 1 av 1 poäng.

4 When interpreting confidence intervals for a difference between two means, if zero is in the interval we should conclude that

Välj ett alternativ:

- ⊙ the population means are different.   ❌
- ○ we are uncertain about whether the population means differ.   ✔
- ○ there is definitely no difference between the population means.
- ○ the confidence interval is incorrectly calculated.

Fel. 0 av 1 poäng.

5 A correlation exists when two different measures of the sample people, events, or things

Välj ett alternativ:

- ○ are in a scatterplot.
- ○ are unrelated.
- ○ are the same.
- ⊙ vary together.   ✅

Rätt. 1 av 1 poäng.

6 Which of the following correlations between two variables gives us the best basis for predicting the value of one variable based on the other?

Välj ett alternativ:

○ r = .05, p = .8

○ r = .001, p = .63

○ r = .21, p = .002

◉ r = -.39, p = .03 ✓

Rätt. 1 av 1 poäng.

7 If a correlation coefficient is .8, we conclude that

Välj ett alternativ:

○ the scatterplot shows a curvilinear relationship.

○ the correlation is weak

○ our ability to make predictions for the variables is poor.

◉ the correlation is strong ✓

Rätt. 1 av 1 poäng.

8 A boxplot shows
Välj ett alternativ:

○ any possible linear trends in the data

○ whether the confidence intervals of two variables' means overlap

○ the categories of a nominal variable

○ the distribution of values of an interval scale variable ✅

Rätt. 1 av 1 poäng.

9 A Type I error arises when we
Välj ett alternativ:

○ reject a true null hypothesis. ✅

○ reject a false null hypothesis.

○ fail to reject a false null hypothesis.

○ fail to reject a true null hypothesis.

Rätt. 1 av 1 poäng.

10 The probability of a Type I error can be reduced by
Välj ett alternativ:

○ decreasing the probability of a Type II error.

○ accepting the null hypothesis.

○ changing alpha from .05 to .01. ✅

○ changing alpha from .05 to .10

Rätt. 1 av 1 poäng.

11 What does the p-value represent in outcomes of statistical tests?

Välj ett alternativ:

○ The likelihood of the null hypothesis in relation to the alternative hypothesis.

◉ The likelihood of the null hypothesis given the data observed.   ❌

○ The likelihood of obtaining at least as extreme result as observed, under the assumption of the alternative hypothesis.

○ The likelihood of obtaining at least as extreme result as observed, under the assumption of the null hypothesis.   ✓

Fel. 0 av 1 poäng.

12 According to Null Hypothesis Significance Testing, using alpha .05, which is the correct description of an outcome of p = .051?

Välj ett alternativ:

◉ Not statistically significant   ✅

○ Marginally statistically significant

○ Statistically significant

○ Trending statistically significant

Rätt. 1 av 1 poäng.

13 To help interpret the effect size measure, *d*, the statistician J. Cohen classified effect sizes as small, medium, and large. According to Cohen, a medium effect size corresponds to a *d* ratio of
Välj ett alternativ:

- ○ .10.

- ○ .20.

- ○ .80.

- ◉ .50. ✅

Rätt. 1 av 1 poäng.

14 In an analysis of variance for repeated measures, the systematic variation due to participants is
Välj ett alternativ:

- ○ balanced across conditions.

- ○ eliminated from the analysis. ✔

- ◉ added to the denominator of the F ratio. ❌

- ○ combined with between-group variation.

Fel. 0 av 1 poäng.

15 If the standard deviation is large, rather than small, in two groups in an independent groups design

Välj ett alternativ:

○ it is easier to find a possible difference in means.

◉ this does not affect the chances of finding a possible difference in means.   ❌

○ it is more difficult to find a possible difference in means.   ✔

○ there is likely to be a difference in means between the groups.

Fel. 0 av 1 poäng.

16 The Chi square test tests

Välj ett alternativ:

◉ whether two variables are associated.   ✅

○ the similarity of categories between two variables.

○ the causal effect of one variable on another variable.

○ the difference in means between two variables.

Rätt. 1 av 1 poäng.

17 What is the relation between Type I and Type II errors in hypothesis testing?

Välj ett alternativ:

- ⦿ Decreased risk of Type I errors increases risk of Type II errors ✅

- ○ Statistically significant results decrease both Type I and Type II errors

- ○ Type I and Type II errors are independent

- ○ Decreased risk of Type I errors decreases risk of Type II errors

Rätt. 1 av 1 poäng.

18 A researcher investigates how performance is affected by instruction type (positive or negative) for skill level (novices or experts) in problem solving, using an independent groups design. Which if the following represents a simple main effect in this experiment?

Välj ett alternativ:

- ○ The effect of instruction type

- ⦿ The effect of instruction type for novices ✅

- ○ The interaction effect between instruction type and skill level

- ○ The effect of skill level

Rätt. 1 av 1 poäng.

19 What is a reason a researcher uses a non-parametric statistical test to test the difference between two groups?

Välj ett alternativ:

○ The dependent variable is measured on an interval scale

○ The differences between means are relatively small

○ The correlation between groups is weak   ✖

○ The assumptions of the t test are not met   ✔

Fel. 0 av 1 poäng.

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ANOVA Summary Table

Consider the ANOVA summary table and answer the following questions.

Tests of Between-Subjects Effects

Dependent Variable: Performance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	710,62[a]	7	101,52	,27	,96	,11
Intercept	47437,042	1	47437,042	125,88	<,001	,89
Group	384,13	3	128,042	,34	,79	,060
Difficulty	51,04	1	51,042	,13	,72	,008
Group * Difficulty	275,45	3	91,81	,24	,87	,044
Error	6029,33	16	376,83			
Total	54177,00	24				
Corrected Total	6739,95	23				

a. R Squared = ,11 (Adjusted R Squared = -,29)

20 How many levels of factor Group are there? `4` ✅

How many levels of factor Difficulty are there? `2` ✅

What is the total number of subjects? `24` ✅

What are the numerator and the denominator for the F ratio corresponding to the interaction effect? **F =** `91.81` ✅ **/** `376.83` ✅

Rätt. 5 av 5 poäng.

21 Which results are statistically significant? (select one or more alternatives)
Välj ett eller flera alternativ:

☐ Main effect of Group

☐ Main effect of Diffculty

☐ Interaction effect of Group and Difficulty

☑ No effects ✅

Rätt. 1 av 1 poäng.

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Output of statistical analysis in SPSS

Consider the output of a statistical analysis in SPSS (8 pages) and answer the questions that follow.

22 **A. What are the probability values (*p* values) associated with *F*-tests for**

a) Main effect of Fictionalty? `0.344` ✓

b) Main effect of Story Emotional Valence? `0.309` ✓

c) Interaction effect of Fictionality and StoryEmotionalValence? `0.021` ✓

B. What are the effect sizes for

a) Main effect of Fictionality? `0.004` ✓

b) Main effect of StoryEmotionalValence? `0.004` ✓

c) Interaction effect of Fictionality and StoryEmotionalValence? `0.021` ✓

Rätt. 6 av 6 poäng.

23   C. What does the output show? (True/false)

a) There is a statistically significant main effect of Fictionality

Välj ett alternativ:

○ Sant

○ Falskt   ✓

b) There is a statistically significant main effect of StoryEmotionalValence

Välj ett alternativ

○ Sant

○ Falskt   ✓

c) There is a statistically significant interaction effect of Fictionality and StoryEmotionalValence

Välj ett alternativ

○ Sant   ✓

○ Falskt

d) There is a statistically significant simple main effect of Fictionality for Positive

Välj ett alternativ

○ Sant

○ Falskt   ✓

e) There is a statistically significant simple main effect of Fictionality for Negative

Välj ett alternativ

○ Sant   ✓

○ Falskt

f) There is a statistically significant simple main effect of StoryEmotionalValence for Fact

Välj ett alternativ

- ◉ Sant ✅

- ◯ Falskt

g) There is a statistically significant simple main effect of StoryEmotionalValence for Fiction

Välj ett alternativ

- ◉ Falskt ✅

- ◯ Sant

Rätt. 7 av 7 poäng.