



STUDENT

**0043-KWH**

TENTAMEN

**TIG109 Tentamen**

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Kurskod	--
Bedömningsform	DT
Starttid	03.05.2023 08:30
Sluttid	03.05.2023 11:30
Bedömningsfrist	--
PDF skapad	29.05.2023 16:50
Skapad av	Lisa Johansson

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**i****TIG109: Metod 2 och projekt, 15 hp, VT 2023****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 23 och för **Väl godkänt** 33 poäng.

**Tillåtet hjälpmedel:** tryckt engelskt lexikon (utan anteckningar)

**i****Multiple-choice questions**

Please select the best alternative.

- 1 If one score in a distribution changes in value then we can be confident that the \_\_\_\_\_ also changes.

**Välj ett alternativ:**

mode

median

mean



range

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Rätt. 1 av 1 poäng.

2 Effect size measures are generally independent of

**Välj ett alternativ:**

- the sample standard deviation.
- the effect of the independent variable.
- sample variability.
- sample size.



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Rätt. 1 av 1 poäng.

3 The confidence interval for a population mean is centered around

**Välj ett alternativ:**

- the sample mean.
- the standard error of the mean.
- the estimated standard error.
- the true population mean.



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Rätt. 1 av 1 poäng.

4 If a correlation coefficient is close to 0.0, we know that

**Välj ett alternativ:**

- the scatterplot shows a curvilinear relationship.
- there is no difference between population means.
- our ability to make predictions for the variables is poor.
- the scatterplot resembles a straight line.



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Rätt. 1 av 1 poäng.

5 The smaller the range of values defining a confidence interval, the

**Välj ett alternativ:**

- more likely the population means differ.
- better our estimate of the population value.
- smaller the estimate of the population value.
- greater the error in estimation.



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Rätt. 1 av 1 poäng.

6 The magnitude or degree of a correlation will increase as points in a scatterplot

**Välj ett alternativ:**

- are spread out.
- correspond to a straight line.
- correspond to the x- and y-axis.
- first increase, then decrease.



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Rätt. 1 av 1 poäng.

7 Outliers in experiment data are values

**Välj ett alternativ:**

- outside the main portion of the data.
- outside one standard deviation from the mean of the data.
- outside the range of the data.
- below or above the mean of the data.



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Rätt. 1 av 1 poäng.

- 8 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:**

$r = .12, p = .63$

$r = -.58, p = .002$



$r = .11, p = .001$

$r = -.59, p = .87$

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Rätt. 1 av 1 poäng.

- 9 The likelihood that an experiment will reveal the effect of an independent variable when the independent variable really had an effect refers to an experiment's

**Välj ett alternativ:**

alpha level.

sensitivity.



significance.

level of significance.

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Rätt. 1 av 1 poäng.

10 A statistically significant outcome is one that has a small likelihood of occurring if the null hypothesis is

**Välj ett alternativ:**

false.

true.



wrong.

accepted.

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Rätt. 1 av 1 poäng.

11 A Type I error arises when we

**Välj ett alternativ:**

reject a true null hypothesis.



fail to reject a false null hypothesis.

reject a false null hypothesis.

fail to reject a true null hypothesis.

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Rätt. 1 av 1 poäng.

12 An effect size measure for an independent groups design with more than two means is

**Välj ett alternativ:**

F squared.

Cohen's r.

Cohen's d.

eta squared.



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Rätt. 1 av 1 poäng.

13 A simple main effects analysis examines the effect of one independent variable

**Välj ett alternativ:**

across all levels of another independent variable.

for all other independent variables.

in a single factor design.

at one level of a second independent variable.



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Rätt. 1 av 1 poäng.

14 A Type II error arises when we

**Välj ett alternativ:**

fail to reject a false null hypothesis.

accept a true null hypothesis.

reject a true null hypothesis.

fail to accept a true null hypothesis.

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Rätt. 1 av 1 poäng.

15 The likelihood that a statistical test will permit researchers to correctly reject a false null hypothesis is called the \_\_\_\_\_ of a test.

**Välj ett alternativ:**

internal validity

alpha level

power



significance

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Rätt. 1 av 1 poäng.

16 When conducting an analysis of variance, we assume that any systematic variation due to the effect of the independent variable is added to

**Välj ett alternativ:**

the null hypothesis.

the denominator of the F ratio.

within-group variation.

between-group variation.



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Rätt. 1 av 1 poäng.



17 If the omnibus analysis of variance for a complex design does not reveal a statistically significant interaction effect, the next step is to determine if the

**Välj ett alternativ:**

- simple main effects are statistically significant.
- comparisons of two means are statistically significant.
- simple interaction effect is statistically significant.
- overall main effects are statistically significant.



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Rätt. 1 av 1 poäng.

18 The Chi square test of independence involves

**Välj ett alternativ:**

- two nominal variables.
- one nominal variable and two or more interval variables.
- one nominal variable and one interval variable.
- two interval variables.



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Rätt. 1 av 1 poäng.

19 Which problem is likely to arise when performing many pairwise comparisons of means?

**Välj ett alternativ:**

- Unequality of variances
- Sphericity
- Type II error
- Type I error



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Rätt. 1 av 1 poäng.

20 An outcome that is not statistically significant in an independent design with two groups

**Välj ett alternativ:**

- shows that the independent variable did not have an effect.
- shows that there are no difference between the groups.
- does not support the conclusion that the independent variable had an effect.
- shows that the power was too low.



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Rätt. 1 av 1 poäng.

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**ANOVA Table**






Consider the following result from an ANOVA and answer the questions that follow.

**Tests of Between-Subjects Effects**

Dependent Variable: Percentcorrect

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5980,80 <sup>a</sup>	5	1196,16	4,61	,001	,29
Intercept	175608,60	1	175608,60	677,12	<,001	,92
Group	4521,90	2	2260,95	8,71	<,001	,24
Instruction	1215,00	1	1215,00	4,68	,035	,080
Group * Instruction	243,90	2	121,95	,47	,62	,017
Error	14004,60	54	259,34			
Total	195594,00	60				
Corrected Total	19985,40	59				

a. R Squared = ,29 (Adjusted R Squared = ,23)

- 21
- a) How many levels of factor Group are there?  
- b) How many levels of factor Instruction are there?  
- c) What is the total number of subjects?  
- d) What are the numerator and the denominator for the  $F$  ratio corresponding to the interaction effect?  $F =$    /  

Rätt. 5 av 5 poäng.

22 Which results are statistically significant? (select one or several)

**Välj ett eller flera alternativ:**

Main effect of Group



Main effect of Instruction



Interaction effect of Group and Instruction

None

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Rätt. 1 av 1 poäng.

**i**




### **Output of statistical analysis in SPSS**

Consider the output of a statistical analysis in SPSS (11 pages) and answer the questions that follow.

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

- a) Main effect of Tasktype  
- b) Main effect of Robottype  
- c) Interaction effect of Tasktype and Robottype  

B. What are the effect sizes for

- a) Main effect of Tasktype  
- b) Main effect of Robottype  
- c) Interaction effect of Tasktype and Robottype  

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

- a) There is a statistically significant main effect of Tasktype

**Välj ett alternativ**

- Falskt 
- Sant

- b) There is a statistically significant main effect of Robottype

**Välj ett alternativ**

- Sant 
- Falskt

- c) There is a statistically significant interaction effect of Tasktype and Robottype

**Välj ett alternativ**

- Sant
- Falskt 

- d) There is a statistically significant simple main effect of Tasktype for Pepper robot

**Välj ett alternativ** Sant Falskt

e) There is a statistically significant simple main effect of Tasktype for Nao robot

**Välj ett alternativ** Sant Falskt

f) There is a statistically significant simple main effect of Tasktype for Furhat robot

**Välj ett alternativ** Sant Falskt