Front page

Department of Economics

Examination paper for (SØK1004) (Statistics for ecdonomists)

Examination date: 22.05.2024

Examination time (from-to): 09-13

Permitted examination support material: C

Calculator, and support material available on Inspera “resources”

Academic contact during examination: Jon Marius vaag Iversen
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Academic contact present at the exam location: NO

OTHER INFORMATION

Get an overview of the question set before you start answering the questions.

Read the questions carefully and make your own assumptions. If a question is unclear/vague, make your own assumptions and specify them in your answer. The academic person is only contacted in case of errors or insufficiencies in the question set. Address an invigilator if you suspect errors or insufficiencies. Write down the question in advance.

Hand drawings/tablet*: The questions can be answered directly in Inspera and/or on handwritten sheets or tablet.

***Hand drawings:** At the bottom of the question you will find a seven-digit code. Fill in this code in the top left corner of the sheets you wish to submit. We recommend that you do this during the exam. If you require access to the codes after the examination time ends, click “Show submission”.

***Tablet:** Save the file on your computer and upload the file in the file-upload task at the end of the exam.

File upload: 15 minutes are added for file upload. The time is included in the time shown at the top left of the test, and the time is reserved for file upload.

Notifications: If there is a need to send a message to the candidates during the exam (e.g. if there is an error in the question set), this will be done by sending a notification in Inspera. A dialogue box will appear. You can re-read the notification by clicking the bell icon in the top right-hand corner of the screen.

Withdrawing from the exam: If you become ill or wish to submit a blank test/withdraw from the exam for another reason, go to the menu in the top right-hand corner and click “Submit blank”. This cannot be undone, even if the test is still open.

Access to your answers: After the exam, you can find your answers in the archive in Inspera. Be aware that it may take a working day until any hand-written material is available in the archive.

1 Question 1

Fill in your answer here

Format

Words: 0

Maximum marks: 10

2 Question 2

Fill in your answer here

Format

Words: 0

Maximum marks: 10

3 Question 3

Fill in your answer here

Format

Words: 0

Maximum marks: 10

4 Question 4

Fill in your answer here

Format

Words: 0

Maximum marks: 10

5 Question 5

Fill in your answer here

Format

Words: 0

Maximum marks: 10

6 Upload file from tablet

Upload your file here. Maximum one file.

All file types are allowed. Maximum file size is **50 GB**

Select file to upload

Maximum marks: 10

Question 1
Attached

Question 1 (30 %)

The US Census Bureau serves as the leading source for quantitative data about the nation's people and economy. The following crosstabulation shows the number of households in 1,000s and the households income by the highest level of education for the head of household. Only households in which the head has a high school diploma or more are included.

Highest level of education	Under $25,000	$25.000 to $49,999	$50,000 to $99,999	$100,000 and over	Total
High school graduate	7,788	8,654	9,441	3,168	29,051
Bachelor's degree	3,678	4,222	7,877	7,899	23,676
Master's degree	888	1,205	3,019	4,111	9,223
Doctoral degree	88	129	357	1,066	1,640
Total	12,442	14,210	20,694	16,244	63,590

Based on this cross-tabulation We have made a joint probability table:

Highest level of education	Under $25,000	$25.000 to $49,999	$50,000 to $99,999	$100,000 and over	Total
High school graduate	12,25 %			4,98 %	45,68 %
Bachelor's degree	5,78 %	6,64 %	12,39 %	12,42 %	37,23 %
Master's degree	1,40 %	1,89 %	4,75 %	6,46 %	14,50 %
Doctoral degree			0,56 %	1,68 %	2,58 %
Total	19,57 %	22,35 %	32,54 %	25,54 %	100,00 %

a) Calculate and fill in the missing cells in the joint probability table.
b) What is the probability that the head of one of the households having a bachelor degree or more education?

c) What is the probability that a household headed by someone with a high school diploma as total education level earning $100,000 or more?
d) What is the probability that one of the households having an income below 25,000?
e) What is the probability of a household headed by someone with a master's degree as total education earning less than $25,000?
f) Is household income independent of educational level?

Question 2
Attached

Question 2 (15 %):

One indicator of the level of economic hardship in a community is the number of people who bring items to a pawnbroker. Assume that the number of people bringing items to the pawnshop per day is normally distributed with a mean of 589.

a) Suppose you learn that on 3,5 % of the days, 560 or fewer people brough items to the pawnshop. Show that the standard deviation of the number of people bringing items to the pawnshop per day is 21.5. (HINT: look at the formulas in the support material)
b) On any given day, what is the probability that between 550 and 650 people bring items to the pawnshop?
c) How many bring items to the pawnshop on the busiest 3.5 % of the days?

Question 3
Attached

Question 3 (20 %)

A hotel manager is interested in number of rooms occupied per day during a particular season of the year. A sample of 25 days of operation has found the following average and variance of the number of rooms occupied per day. $\bar{x} = 250$ and $s^2 = 1000$

Given the information above

a) Construct the 90% confidence interval of the μ (population mean).
b) What is the interpretation of that confidence interval?

From now on assume that the population standard deviation σ is known to be 100.

c) Construct the 90% confidence interval of the μ (population mean).
d) What is the interpretation of that confidence interval and how does it compare with the result of parts A and B?

Question 4
Attached

Question 4 (15 %)

NRK reports that young children in Norway are exposed to an average of 3 hours of mobile phone usage per day. You have a research hypothesis that children from low-income families are exposed to more than 3 hours mobile phone usage every day. In order to test this hypothesis, you have collected a random sample of 60 children from low-income families and found that these children were in fact exposed to a sample mean of 3.5 hours of daily mobile phone usage

A) Develop hypotheses that can be used to test your research hypothesis.
B) Based on a previous study, you are willing to assume that the population standard deviation is $\sigma = 1.5$ hours. Show that the p-value based on your sample of 60 children from low-income families is 0.0049.
C) Use $\alpha = .01$ as the level of significance. What is your conclusion?

Question 5
Attached

Question 5 (20 %)

Filling boxes with consistent amounts of its cereals are critical to General Mills' success. The filling variance for boxes of Count Chocula cereal is designed to be .03 oz^2 or less. A sample of 36 boxes of Count Chocula shows a sample standard deviation of .18 oz. Use $\alpha = .05$ to determine whether the variance in the cereal box fillings is exceeding the design specification.