GX415

OLLSCOIL NA hEIREANN, GAILLIMH
NATIONAL UNIVERSITY OF IRELAND, GALWAY

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Statistics for Economics (EC224)

2nd Arts

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Time allowed: Three hours.

Instructions: Answer 10 questions in Section 1 (each worth 2 marks). Answer 2 questions in Section 2 (each worth 20 marks). Answer 8 questions in Section 3 (each worth 10 marks). Total marks are 140.

Section 1

For all of the following statements, indicate if they are true or false.

1- **(1)** $\sum \frac{(x_i - \bar{x})^2}{n}$ is the usual formula for sample standard deviation.

1- **(2)** Variables with a standard normal distribution must always have a variance equal to the standard deviation.

1- **(3)** The random distribution of questions with a 'false' answer in the 'true/false' section of an exam can be seen as an example of a Hypergeometric process.

1. **(4)** The major disadvantage of random sampling is that $\bar{x}$ is never equal to μ.

1- **(5)** If the median is larger than the mean the distribution is skewed left.

1. **(6)** If a confidence interval for $\bar{x}$ straddles zero, then a null hypothesis of zero population mean will be rejected (at the same level of significance)?

1. **(7)** The interquartile range is the interval between the 1st and 2nd quartile.

1- **(8)** The coefficient of variation is often negative.

1- **(9)** The coefficient of correlation can assume any value between -1 and 1.

1- **(10)** α is the probability of a type 2 error.

1- **(11)** Confidence intervals widen as n increases..

1- **(12)** The mean is easily readable from a cumulative frequency table.

Section 2: Answer 2 of the following questions.

2. **(1)** A regression analysis of the relation between education (as measured in years of schooling) and salary (measured in 1000s of euro) for 40 people selected at random yields the following results:

$$\hat{Sal} = 10 + 1.5(Educ).$$
s.e. (4.3) (.56)

a) Interpret the two coefficients.
b) Test the hypothesis that an extra year's education leads on average to an extra 1000 euro in
salary.
c) Test the hypothesis that education has a sigbificant effect on salaries.
d) Set up confidence intervals for the two coefficients at the 95% probability level.

2. **(2)** In a statistical study a researcher is interested in opinions about a new movie. The audience are from three different age-groups. The researcher wishes to determine whether there are differences in median opinion among age groups (where each person is allowed to rate the movie from 1 – very bad – to 10 – very good). Test the following hypothesis:

$H_0: M_1 = M_2 = M_3$. H_1: *Not all* M_j *are equal.*

Opinions of Age-Group 1:	3, 8, 5, 7, 10, 9
Opinions of Age-Group 2:	4, 7, 9, 5, 8, 10
Opinions of Age-Group 3:	5, 1, 2, 6, 4, 1

2. **(3)** X is a normally distributed variable, with equal variance in three regions. A policy agency wants to test for equality of means across the three regions using the following sample information on values of X from 12 companies:

REGION A	REGION B	REGION C
50	55	60
69	50	59
46	53	48
64	48	76
51	53	67

a) State H_o and H_1.
b) Develop the ANOVA table.
c) Test the null hypothesis at the 5% level of significance and interpret the results.

Section 3: Answer 8 of the following 10 questions.

3- (1) Under what circumstances will r-squared in regression analysis = 1?

3- (2) A shop stall sells 40 dresses per hour. What is the probability that 25 dresses are sold in a half-hour interval during peak period.

3- (3) A box of 11 Christmas crackers has 3 empty crackers in it. If 4 crackers are selected from the box, find the probability that 3 are defective.

3- (4) The age distribution in a certain place is normally distributed with a mean of 45 and a standard deviation of 10. On this basis, a) what proportion of the inhabitants are more than 68 and b) between what ages do the middle 80% of the people fall?

3- (5) A national 'bank estimates that it loses 50% of its clients each year. If one particular local branch currently has 80 students who have opened accounts, what is the probability that no more than 37 of these will not still be with the bank the next year.

3- (6) A random sample of 151 items is drawn from a normal population with parameters $\mu = 3003$ and $\sigma = 77$. Find the probability that the sample mean is between 2800 and 3200.

3- (7) A frozen dinner is advertised as having only 300 calories. Consumer tests show an average of 314 calories, from a sample of 60. The sample standard deviation is 18 and the level of significance chosen for decision making is .05. Should the advertiser's claim be accepted?

3- (8) Given the following results:

$n_1 = 6; n_2 = 4; n_3 = 4$

$\bar{x}_1 = 61; \bar{x}_2 = 59; \bar{x}_3 = 55$

$SST = 100; SSTR = 60$

Test $H_0: \mu_1 = \mu_2 = \mu_3$ at the .05 level of significance.

3- (9) Compute the Pearson's Correlation coefficient for the following data:

Y 11, 10, 8, 8, 6, 13 X 2, 5, 3, 3, 6, 3

3- (10) a) What are the differences between a type 1 and a type 2 errors? b) Discuss differences between one tailed and two tailed tests.