

**CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

Autumn Examinations 2017/18

School: Business & Humanities

Programme Title: Bachelor of Business Studies (Honours) in Information Systems –
Year 1

Programme Code: BBISY_8_Y1

Module Title: Mathematics and Statistics for Information Systems I

Module Code: MATH 6057

External Examiner(s): Dr James Cruickshank

Internal Examiner(s): Dr Declan O' Connor

Instructions:

Answer All Questions.

Question 1 carries 40 marks.

Questions 2 and 3 carry 30 marks each.

Do not write, draw or underline in RED

Show all calculations and workings in full where possible.

Duration: 2 Hours

Sitting: Autumn 2018

Requirements for this examination: Mathematical tables. (Dept of Ed)

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you are attempting the correct examination.
If in doubt please contact an Invigilator.

Question 1 Answer **all** parts (10 x 4 marks = 40 marks)

- a) The profits of a company were divided between its three directors Amy, Brian and Carol in the ratio of 6:4:2. If Carol received €25,000 for 2017, find the total profit earned by the company in 2017.
- b) Transpose the formula $\frac{m}{n} = \frac{n}{x-3}$ for n.
- c) Solve the equation $3p - \frac{1}{2}\left(5 + \frac{5p}{7}\right) = \frac{p}{2} + 3$.
- d) Simplify $6 + 3(ab + a) - \frac{2}{3}(b - ab) + 6a - 4ab - 3b$.
- e) Calculate the mean and median for the following dataset {12,14,9,17,6,8,12,14,16,12,14,6}
- f) Explain in your own words what the following means,
(i) $\neg p \vee \neg q$
(ii) $p \wedge \neg q$
- g) Which of the following are logical propositions
- 1) $10 + 40 = 20$
 - 2) Close the door!
 - 3) What time is it?
 - 4) Dublin is the capital of Ireland.
 - 5) None of the above
- h) A saver has deposited a sum of money into an account that earns an annual interest rate of 0.75%. Assuming that interest is compounded annually, calculate the initial amount deposited into the account if after five years there is €1,234.56 in the account. Round your answer to two decimal places.
- i) Eight people can complete a task in 12 hours. How long will it take six people to complete the same task?
- j) Calculate the equation of the line containing the points: $\left(\frac{1}{4}, 5\right)$ and $\left(\frac{1}{3}, -\frac{5}{12}\right)$.

Question 2 Answer **all** parts (30 marks)

(a) Using a truth table prove

$$\neg(p \vee q) \Leftrightarrow (\neg p) \wedge (\neg q)$$

What is the proof better known as?

(10 marks)

(b) The following table shows the value of one euro in various currencies on a particular day:

Currency	€1 is worth
Pound Sterling (£)	0.8555
Danish Krone (DK)	7.1250
US Dollar \$	1.2950
Australian Dollar (Aus \$)	1.4500

A person in England pays £15.50 per month for a SKY package, her cousin in the US pays \$18.25 and a further cousin in Australia pays AUS\$ 20.55. In which country is the SKY package most expensive?

(6 marks)

(c) The following data shows the overtime worked by 30 sales people last year:

10	15	51	36	85	115
28	115	68	50	68	96
25	95	24	29	86	70
42	42	30	59	72	93
78	33	76	111	74	38

Form a frequency distribution table with six classes of equal width.

(8 marks)

(d) The table below shows the average monthly rent paid by residents of a town for the years 2013 to 2017.

Year	2013	2014	2015	2016	2017
Rent (€)	645	790	815	825	855

(i) Calculate the fixed base index for the rent using 2014 as the base year. Round all answers to the nearest two decimal places.

(ii) What is the percentage change from 2013 to 2016?

(6 marks)

Question 3 Answer **all** parts (30 marks)

The time spent by new visitors to a website is shown in the following table

Seconds	Number of visitors
20 and less than 40	10
40 and less than 60	30
60 and less than 100	50
100 and less than 120	20
120 and less than 160	10

- (i) Calculate the mean number of visitors and the standard deviation from the mean
(10 marks).
- (ii) Using a suitable formula calculate the median. (6 marks)
- (iii) Draw an ogive for this data (6 marks)
- (iv) Use the ogive to estimate the value of the first and third quartiles. (4 marks)
- (v) What percentage of visitors spend more than 130 seconds on the website?
(4 Marks)

Statistical Formulae

Mean of an array $\bar{x} = \frac{\sum x}{n}$

Mean of a frequency distribution $\bar{x} = \frac{\sum fx}{\sum f}$

Population Standard Deviation $= \sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$ or $\sqrt{\frac{\sum f(x-\mu)^2}{N}}$

$$\text{Mode} = L_M + C_M \left[\frac{f_M - f_{M-1}}{2f_M - (f_{M-1} + f_{M+1})} \right]$$

$$\text{Median} = L_M + C_M \left(\frac{\frac{1}{2}N - F_{M-1}}{f_M} \right)$$

Coefficient of Variation $C_v = \frac{\sigma}{\mu} * 100$

Coefficient of Skewness $= \frac{3(\text{Mean} - \text{Median})}{\text{Standard Deviation}}$

Interest Formulae

Compound Interest: $A = (1+i)$

Coordinate Geometry

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Equation of a Line: $y - y_1 = m(x - x_1)$
 $y = mx + c$