

**CORK INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Autumn Examination 2017/2018**

**Module Title: Essential Mathematics and Statistics for Business**

**Module Code:** MATH6051

**School:** Business

**Programme Titles:** Bachelor of Business (Ord) in Business Administration (BBADM)  
Bachelor of Business (Ord) in Business Studies (BBUSS)  
Bachelor of Business in Management (BMNGT)  
Higher Cert in Business Studies (BBUSE)  
Higher Certificate in Business (BBUSA)

**Programmes Codes:** BBADM\_7\_Y1  
BBUSS\_7\_Y1  
BMNGT\_7\_Y2  
BBUSE\_6\_Y1  
BBUSA\_6\_Y1

**External Examiner:** Professor Michael Wallace

**Internal Examiners:** Dr. Declan O Connor, Dr. Shane O'Rourke, Ms. Grainne Read, Ms. Katie Bullen.

**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.  
Please include your class group and lecturer's name on the front cover of each answer book.

**Duration:** 2 Hours

**Sitting:** Autumn 2018

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

## Question 1

Answer **all** parts

- (a) A retailer of kitchen appliances adds a markup of 40% to the cost price of all goods that he sells. (So if the cost price is €100 the sale price is €140.) The sale price of a dishwasher is €312.50. Find the cost price of the dishwasher

**(5 marks)**

- (b) The table below shows the number of members of a badminton club.
- Calculate fixed base index numbers for the data taking 2012 to be the base year. (Round all answers to two decimal places.)
  - What was the percentage increase in membership between 2012 and 2014?

Year	2012	2013	2014	2015	2016
Number of members	124	148	140	112	120

**(5 marks)**

- (c) The following table gives the conversion ratio of one euro to a variety of different currencies.

Currency	€1 is worth	Currency	€1 is worth
Pound Sterling	0.92457	Czech Koruna	28.0143
US Dollar	1.20734	Danish Krone	6.74993
Australian Dollar	1.65000		

Use the information in the table to answer the following questions:

- It costs USD 899 to buy an iPhone 8 in the US, and AUD 988 to buy an iPhone 8 in Australia. Find which is cheaper, and find the difference in price in euros.
- A first edition copy of the novel *Tess of the d'Urbervilles* costs 280 pounds sterling. It costs an additional €15 to ship it to Ireland. Find the total cost in euros.

**(5 marks)**

- (d) A saver deposits €2500 into an account that earns an annual interest rate of 1.5%. Assuming that interest is compounded annually, calculate the final amount after ten years. Give your answer to the nearest cent.

**(5 marks)**

## Question 1 continued ...

(e) Simplify the following expressions.

(i)  $(2m^3n)^4$

(ii)  $\frac{6x^4 y^2}{(2xy^3)^2}$

(5 marks)

(f) Transpose the following equation to make  $p$  the subject.

$$4(p - 2q) = 2(q + 3p + 1)$$

(5 marks)

(g) The variables  $s$ ,  $q$  and  $y$  are related by the equation

$$y = \frac{s^4 - 1}{s - 1}(5q + 3).$$

Find the value of  $y$  given that  $s = 2.3$  and  $q = \frac{2}{7}$ . Give your answer correct to 3 significant figures.

(5 marks)

- (h) (i) Find the slope of the line passing through the two points  $(3, -8)$  and  $(5, 4)$ .  
(ii) The line  $y = -3x + 7$  crosses the x-axis at the point  $(a, 0)$ . Find the value of  $a$ .

(5 marks)

## Question 2

- (a) The ratio of teachers to pupils in a school is 1:18.
- (i) What percentage of the school population are teachers? **(2 marks)**
- (ii) If there are 252 students in the school. How many teachers are there in this school? **(2 marks)**
- (b) The mean age of five athletes is 24 years. If the first four are aged 21, 23, 27 and 25 years,
- (i) how old is the fifth athlete? **(2 marks)**
- (ii) what is the median age of the five athletes? **(2 marks)**
- (c) The monthly health insurance payments for a random sample of 120 employees in a company were examined and the findings tabulated as follows:

Monthly Payment (€'s)	No. of Employees
40 but less than 70	15
70 but less than 100	25
100 but less than 130	40
130 but less than 160	30
160 but less than 200	10

- (i) Calculate the mean monthly health insurance payment and the standard deviation from the mean **(9 marks)**
- (ii) Calculate the median. **(5 marks)**
- (iii) Draw a histogram for this data **(6 marks)**
- (iv) Use the histogram to estimate the value of the mode for this data. **(2 marks)**

### Question 3

- (a) The table below shows the distances (km) recorded by 100 salespeople in the course of one week.

<i>Kilometers</i>	<i>Frequency</i>
400 – under 420	10
420 – under 440	22
440 – under 460	29
460 – under 480	19
480 – under 500	12
500 – under 520	8

- (i) Complete the cumulative frequency distribution table for the data. **(4 marks)**
- (ii) Represent the data with an ogive. **(5 marks)**
- (iii) In which class does the median lie? Estimate the median from the ogive and use a formula to verify your answer. **(6 marks)**
- (iv) Use the ogive to estimate the number of salespeople who travelled 430km or less that week. **(2 marks)**
- (v) Estimate the interquartile range from your graph. **(3 marks)**
- (b) According to a recent report in The Irish Examiner, at the time of the last census it was recorded that the number of homeless people was 6906. Of these 1,846 were aged 17 or under. The report also claims that there has been an 81% increase in homelessness since 2011. From this information:
- (i) What percentage of homeless people are aged 17 or under? **(5 marks)**
- (ii) Estimate the number of people that were homeless in 2011. **(5 marks)**

## Statistical Formulae

Mean

$$\mu = \frac{\sum x}{n} \qquad \mu = \frac{\sum fx}{\sum f} \qquad \mu = a + c \left( \frac{\sum f \left( \frac{d}{c} \right)}{\sum f} \right)$$

Standard Deviation

$$\sigma = \sqrt{\frac{\sum f(x - \mu)^2}{\sum f}} \qquad \sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \left( \frac{\sum fx}{\sum f} \right)^2}$$

$$\sigma = a \sqrt{\frac{\sum f \left( \frac{d}{c} \right)^2}{\sum f} - \left( \frac{\sum f \left( \frac{d}{c} \right)}{\sum f} \right)^2}$$

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

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

$$\text{Coefficient of Variation} = \frac{\sigma}{\mu} \times 100$$

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

## Interest Formulae

$$\text{Compound Interest: } A = P(1 + i)^t$$

## Coordinate Geometry

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

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