CORK INSTITUTE OF TECHNOLOGY

INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2017/2018

Module Title: Engineering Computing I

Module Code:	MATH6031
School:	School of Engineering
Programme Title:	B.Eng. (Hons) in Structural Engineering – Year 1 B.Eng. (Hons) Common Entry – Year 1 B.Eng. (Hons) in Chemical and Biopharmaceutical Engineering B.Eng. (Hons) in Mechanical Engineering
Programme Code:	CR_CSTRU_8 CR_EOMNI_8 CR_ECPEN_8 CR_EMECH_8
External Examiners(s):	Dr. Ann O'Shea
Internal Examiners(s):	Dr. Robert Heffernan Mr. Adrian O'Connor
Instructions:	Answer all **three** questions. You should save your work in a single **macro-enabled** Excel file.
Duration:	2 Hours
Sitting:	Autumn 2018
Requirements for this examination:	

Note to Candidates:

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

Question 1. **[30 marks]**

(a) Write a VBA **function** called `PSum` that computes the sum

$$\sum_{i=0}^{n} 2^i = 1+2+4+\cdots+2^n.$$

This function should take one `Integer` value as an argument and should return an `Integer` value.

(b) Add a command-button to your workbook that, when clicked, prompts the user for a positive integer n and then displays a message box giving the result of supplying the number n to the function `PSum`.

Question 2. **[30 marks]**

Write a command button that, when clicked, causes the following table to be written to the spreadsheet:

2	3	4	5	6
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9
6	7	8	9	10

Your code should contain a **nested loop**.

Question 3. **[40 marks]**

Given an approximation x_{n-1} to a root of a function $f(x)$, the **Newton-Raphson** method tries to find a better approximation to the root by computing

$$x_n = x_{n-1} - \frac{f(x_{n-1})}{f'(x_{n-1})}$$

where f' is the derivative of f.

- Use Excel to graph the function $f(x) = x^2 - 10$ over the interval $[2,4]$ using a step size of 0.1.
- Write code to implement the Newton-Raphson method.
- You should use $\varepsilon = 10^{-5}$ as your tolerance.
- Your code should ask the user for a initial values of a and b using input boxes and display the final approximation using a message box.