**GRIFFITH COLLEGE DUBLIN**

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**QUALITY AND QUALIFICATIONS IRELAND**

**EXAMINATION**

**BACHELOR OF SCIENCE (HONS) IN COMPUTING SCIENCE**

**STAGE II**

**LINEAR ALGEBRA**

**Module Code: BSCH-LA**

**BACHELOR OF SCIENCE IN COMPUTING**

**STAGE II**

**LINEAR ALGEBRA**

**Module Code: BSCO-LA**

**HIGHER CERTIFICATE IN COMPUTING SCIENCE**

**STAGE II**

**LINEAR ALGEBRA**

**Module Code: HCC-LA**

**Lecturer: Patrick Hayes**

**Pat Nevin/Deirdre Casey**

**External Examiner(s): Dr Keith Maycock**

**Dr Aidan Mooney**

**Date: 14th May 2015 Time: 9.45-11.45**

**THIS PAPER CONSISTS OF FIVE QUESTIONS**

**FOUR QUESTIONS TO BE ATTEMPTED**

# ALL QUESTIONS CARRY EQUAL MARKS

**THE USE OF NON PROGRAMMABLE CALCULATORS IS PERMITTED**

**GRAPH PAPER TO BE SUPPLIED**

***Note****:* Solutions will get credit for “correct method of working” and, where appropriate, for “checking the answer”.

**QUESTION 1** (logs and exponents)

1. Solve the following expression for x:

**log(x) + log(x - 1) = log(4x)**

**(5 marks)**

1. Solve the following expression for x:

**log3(x + 25) - log3(x -1) = 3**

**(5 marks)**

1. Determine the following expression, (multiply and remove the brackets):

**(2a + 5b - 6)(3a2 – 5b – 7)**

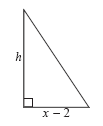
**(5 marks)**

1. Factorise the following expression, and solve for y:

**3y2 – 7y + 2 = 0**

**(5 marks)**

1. The area of the triangle shown below is  **x2 + x – 5**.



Express ***h*** in terms of *x*.

**(5 marks)**

**Total (25 marks)**

**QUESTION 2** (matrices and Cramer)

1. Given the matrices **A, B** and **C** below:

A = B = C =

1. Evaluate **6A,** (if it is not possible give a brief explanation).

**(2 marks)**

1. Evaluate **B \* A,** (if it is not possible give a brief explanation).

**(2 marks)**

1. Evaluate **C \* A,** (if it is not possible give a brief explanation).

**(3 marks)**

1. Evaluate **A \* B,** (if it is not possible give a brief explanation).

**(3 marks)**

1. Given the following system of equations:

**3x – 2y + 5z = 3**

**-2x + y + 4z = -2**

**x + 4y – 7z = 1**

Using **Cramer’s Rule** solve for x, y and z.

**(15 marks)**

**Total (25 marks)**

**QUESTION 3** (sets)

1. Consider the following sets :

***A*** = {1, 2, 3} ***B*** = {1, 3} ***C*** = {1, 2, 4} ***D*** = {1, 2, 3, 4} and ***E*** = {2, 1, 3}

1. Which of the sets are **equal**?

**(2 marks)**

1. Which of the sets are **subsets** of the others?

**(4 marks)**

1. Find ***A***∪***B***

**(2 marks)**

1. Find ***B***∩***C***

**(2 marks)**

1. Each member of a software development team of 16 is involved with at least one of systems analysis, coding, and maintenance. 10 worked on systems analysis, 6 worked on coding and 9 on maintenance. 3 worked on systems analysis and coding, 3 on coding and maintenance, and 2 on all three.
2. Draw a **Venn Diagram** to represent the team.

**(12 marks)**

1. From the Venn diagram evaluate how many team members were involved in systems analysis and maintenance, but not coding.

**(3 marks)**

**Total (25 marks)**

**QUESTION 4** (vectors)

1. Differentiate between the **parallelogram** **rule** and the **triangle rule** for vector addition (you **must** use diagrams).

**(5 marks)**

1. Find the sum of the vectors **AK** + **KL** + **LP** + **PQ** + **QR**

**(5 marks)**

1. An aircraft travels due East at 500km/h. It encounters a tailwind of 80km/h acting in a direction of 40 degrees East of North.
2. Draw a vector diagram of this situation.

**(5 marks)**

1. What is the resultant speed of the aircraft?

**(5 marks)**

1. What is the new direction of the aircraft?

**(5 marks)**

**Total (25 marks)**

**QUESTION 5** (graphs and polynomials)

1. Differentiate the function, **y = 2x2 + x - 1**

**(2 marks)**

1. Differentiate the function, **y = x3 – 2x2 – x + 2**

**(3 marks)**

1. Construct a table of values for x and plot the graph of **y = 2x2 + x - 1** for **-4 ≤ x ≤ +3**, with **intervals of 1**.

**(10 marks)**

1. Construct a table of values for x and plot the graph of **y = x3 – 2x2 – x + 2** for **-2 ≤ x ≤ +3**, with **intervals of 0.5**.

**(10 marks)**

**Total (25 marks)**