**GRIFFITH COLLEGE DUBLIN**

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**QUALITY AND QUALIFICATIONS IRELAND**

**EXAMINATION**

**HIGHER CERTIFICATE IN COMPUTING SCIENCE**

**STAGE II**

**LINEAR ALGEBRA**

**Module Code: HCC-LA**

**BACHELOR OF SCIENCE IN COMPUTING**

**STAGE II**

**LINEAR ALGEBRA**

**Module Code: BSCO-LA**

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

**STAGE II**

**LINEAR ALGEBRA**

**Module Code: BSCH-LA**

**Lecturer: Patrick Hayes**

**Doni Hickey/David O’Sullivan**

**External Examiner(s): Thanh Thoa Pham Thi**

**Date: 16th May 2017 Time: 2.15-4.15**

**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**

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

A = B = C =

1. Evaluate 6**A,** (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 matrices and **Cramer’s Rule** solve for x, y and z.

**(15 marks)**

**Total (25 marks)**

**QUESTION 2**

1. Consider a triangle ABC with one angle, BAD = 45⁰.

A perpendicular is dropped from B and meets AC at D.

The area of triangle BCD is 1.5 times the area of triangle ABD.

See diagram below.

**A**

**B**

**C**

**D**

**45**

Diagram is **NOT** accurately drawn.

* 1. Calculate the size of **angle ABC**, to two decimal places.

**(5 marks)**

* 1. Calculate the size of **angle ACB**, to two decimal places.

**(5 marks)**

1. Given two vectors **a** = {3, 4, 0} and **b** = {4, 4, 2}.
   1. **Add** vectors **a** and **b**.

**(2 marks)**

* 1. **Subtract** vector **a** from vector **b**.

**(3 marks)**

* 1. Calculate the **cross product** of **a** and **b, a**x**b**.

**(5 marks)**

* 1. Find the **angle between the vectors** **a** and **b**, to two decimal places.

**(5 marks)**

**Total (25 marks)**

**QUESTION 3**

1. Solve the following quadratic equation for x

5x2 + 6x = 8

**(5 marks)**

1. You are required to plot the graph of a function of x.
2. Construct a table of values for x and y where **y = x3 - 2x2 – x + 2**

for **-2 ≤ x ≤ +3**, with **intervals of 0.5**.

You **must** show the intermediate values for each part of the function.

***Note****: you are advised to use 1 decimal places of accuracy for calculations.*

**(12 marks)**

1. Plot the graph of **y = x3 - 2x2 – x + 2** for **-2 ≤ x ≤ +3**, with **intervals of 0.5**.

**(8 marks)**

**Total (25 marks)**

**QUESTION 4**

1. Knowing that cos2θ + sin2θ = 1, prove each of the following identities:
2. + tan x =

**(4 marks)**

1. sin x - sin x cos2 x = sin3 x

**(4 marks)**

1. Solve for x, where **log2(x) + log2(x – 2) = 3**

**(6 marks)**

1. Evaluate the modulo arithmetic expressions, **1213  (mod 11)**

**(2 marks)**

1. Create a **modulo 8** multiplication table.

**(5 marks)**

1. Find the multiplicative inverses for **modulo 7**.

**(4 marks)**

**Total (25 marks)**

**QUESTION 5**

1. Where matrix **M** =
2. Find the **inverse** of matrix **M** using Minors, Cofactors and the Adjugate (adjunct).

**(16 marks)**

1. Check your answer from (i), above

**(3 marks)**

1. Consider the following matrices, **A** and **B**

**A =**

**B =**

1. Calculate **A.B**, if it is not possible give an explanation why not.

**(3 marks)**

1. Calculate **B.A**, if it is not possible give an explanation why not

**(3 marks)**

**Total (25 marks)**