**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**

**Deirdre Casey**

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

**Date: 17th May 2016 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**

1. Solve the following quadratic equations:
   1. x2 = 3x – 2

**(3 marks)**

* 1. (x -2)2 = 16

**(3 marks)**

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

**(2 marks)**

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

**(3 marks)**

1. You are required to plot the graph of a function of x.
   1. Construct a table of values for x and y where **y =** for **0 ≤ x ≤ +3**, with **intervals of 0.2**.

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

**(6 marks)**

* 1. Plot the graph of **y =** for **0 ≤ x ≤ +2**, with **intervals of 0.2**.

**(8 marks)**

**Note:** in this instance you should use 2 decimal places of accuracy for calculations.

**Total (25 marks)**

**QUESTION 2**

1. A ladder, of length 3m, leans against a vertical wall at an angle of 60 degrees to the horizontal.
   1. Find the **vertical height** of the top of the ladder, (to 2 decimal places).

**(3 marks)**

* 1. Find the distance from the foot of the ladder to the wall, (to 2 decimal places).

**(3 marks)**

1. Using the identity cos2θ + sin2θ = 1, prove that **tanθ sinθ + cos θ = secθ**

**(5 marks)**

1. Prove that, **log2(log2(log2(16))) = 1**

**(7 marks)**

1. If the logarithm of **5832** is **6** to some base. Find the base.

**(7 marks)**

**Total (25 marks)**

**QUESTION 3**

Given the following system of equations:

3x - 2y + 8z = 9

-2x + 2y + z = 3

x + 2y - 3z = 8

1. Rewrite the system in matrix form **Ax = b**

**(3 marks)**

1. Create the **augmented** matrix for the system.

**(3 marks)**

1. Using matrices and **Gauss Jordan elimination** solve for x, y and z.

**(19 marks)**

**Total (25 marks)**

**QUESTION 4**

1. Explain the **parallelogram** **rule** for vector addition.

(You **must** use diagrams).

**(4 marks)**

1. Consider the vectors **a** and **b**, such that:

**a** = 5**i** + **j** + 4**k**

**b** = -**i** + 2**k**

1. Find the magnitude of **a**

**(2 marks)**

1. Find the magnitude of **b**

**(2 marks)**

1. Compute the dot product of **a** and **b**

**(2 marks)**

1. Compute the cross product of **a** and **b**

**(5 marks)**

1. Find the angle between vectors **a** and **b** (to the nearest degree)

**(5 marks)**

1. Find the sum of the vectors **PQ** + **QR** + **RS** + **ST** + **QP**

**(5 marks)**

**Total (25 marks)**

**QUESTION 5**

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

A =

B =

C =

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

**(3 marks)**

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

**(2 marks)**

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

**(3 marks)**

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

**(2 marks)**

1. Find the **inverse** of matrix **A**, where **A** =

**(15 marks)**

**Total (25 marks)**