

UNIVERSITY *of* LIMERICK
OLLSCOIL LUIMNIGH

Faculty of Science and Engineering

MID-SEMESTER ASSESSMENT PAPER

MODULE CODE: MA4402

SEMESTER: Autumn 2014

MODULE TITLE: Computer Mathematics 2

DURATION OF EXAMINATION: 45 minutes

LECTURER: Dr. N. Kopteva

PERCENTAGE OF TOTAL MARKS: 20%

INSTRUCTIONS TO CANDIDATES: Answer ALL QUESTIONS.

To obtain maximum marks you must show all your work clearly and in detail.

Write all your answers and rough work on the examination paper. Do not write on anything else.

Under no circumstances should you use your own tables or be in possession of any writing material other than this exam paper.

The examination rules of the University apply to this midterm. Any breaches of these rules (and in particular any attempt at cheating) will result in disciplinary proceedings. For a first offence this can result in a year's suspension from the University.

Your Name: (PLEASE PRINT) _____

Your UL ID: _____

ROUGH WORK

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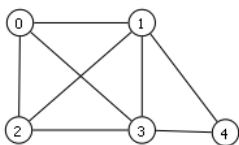
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**Please, do NOT open this paper
until ANNOUNCED by your lecturer**

EVERYBODY IS SUPPOSED TO START AT THE SAME TIME

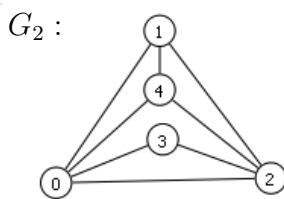
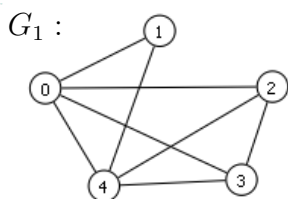
1 Draw a binary tree to represent the algebraic expression $2 + 3^{2x+1}$. 1%

2 Consider the graph G_0 :



Find an Eulerian Circuit or an Eulerian Path in this graph, or prove that neither exists. Is it an Eulerian graph? Is it a traversable graph? 3%

3 Which of the graphs G_1 and G_2 below is isomorphic to the graph G_0 from Question 2? In each case, justify your answer, i.e. either establish an isomorphism, or provide an argument that none exists. 6%



4 Evaluate the matrix products AB and BA , and hence the determinants $\det(AB)$ and $\det(BA + C)$ for the matrices 4%

$$A = \begin{bmatrix} 2 & 0 & 3 & 1 \\ 0 & 1 & -1 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 \\ 0 & -2 \\ 2 & 0 \\ -1 & 2 \end{bmatrix}, \quad C = \begin{bmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 2 \end{bmatrix}.$$

5 Evaluate the area of the triangle $\triangle ABC$ whose vertices are $A = (1, 0)$, $B = (4, 1)$, and $C = (3, 4)$. 2%

6 Describe the triangle $\triangle A'B'C'$ obtained by rotating the triangle $\triangle ABC$ from Question 5 by the angle $\frac{\pi}{4} = 45^\circ$ in the anti-clockwise direction about the point B . 4%

USEFUL FORMULAE:

Angle	0	$\frac{\pi}{6} = 30^\circ$	$\frac{\pi}{4} = 45^\circ$	$\frac{\pi}{3} = 60^\circ$	$\frac{\pi}{2} = 90^\circ$
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0

Question 1.

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Question 2.

Question 3.

Question 4.

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Question 5.

Question 6.