

MA1201 B17/18 Assignment 3 Deadline: 3pm 26/4/2018 (Thursday) Venue: Thursday Tutorial Classes

Instruction: Write down clearly the course session (A/B/C/D/E/F/G/H) and the tutorial session you have registered together with your full name and student number on the front page of your answer script and hand the original hard copy to your tutorial class on Thursday on or before the deadline. In case your tutorial class is scheduled on Tuesday, please hand the original hard copy to your tutor in one of the tutorial classes on Thursday. **Please remind that we don't accept soft copies and photo copies. Marks will not be recorded if you submit the hard copy to the wrong tutor or after the deadline.**

1. If $\frac{1+z}{1-z} = i$, what is the modulus of z ? [10]

2. Suppose a complex number z satisfies the quadratic equation
$$2z^2 - (3 + 8i)z - (m + 4i) = 0, \quad z \in \mathbb{C}.$$

Given that m is a real constant and that one of the two solutions is real, find the two solutions of the above complex quadratic equation. [30]

3. Let $A = \begin{pmatrix} 3 & 1 & -2 \\ -2 & 2 & 2 \\ 0 & 1 & 1 \end{pmatrix}.$

a) Evaluate the determinant of A by the cofactor expansion and compute $|A^{-2}|$. [10]

b) Find all values of λ such that $|\lambda I - A| = 0$. [20]

4. Given that

$$A = \begin{pmatrix} 1 & -2 & 1 & 1 \\ 0 & 0 & 1 & -1 \\ -1 & 2 & 1 & -3 \end{pmatrix}, \quad b = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}.$$

a) Solve the linear system $Ax = b$ by the Gaussian elimination and express the general solution in vector form. [20]

b) Write down the corresponding homogenous system $Ax = 0$ explicitly and determine all non-trivial solutions from (a) without resolving it. [10]

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