Session: **Name:** **Student ID:**

MA 1201 Semester B 2020/21

Assignment 3 — Due at 5 pm, 22/4/2020 (Thursday) online on Canvas

Instructions:

- Please show your work. Unsupported answers will receive **NO** credits.
- Make sure you write down the correct lecture session (A/B/C/D/E/F/G/H) you have registered for, together with your full name and student ID on the front page of your answer script. Scan your solution into a single pdf file and upload it to Canvas.
- **NO** late homework will be accepted. Homework submitted to wrong tutorial sessions will **NOT** be graded and will receive **0 POINTS**.

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1. (20 points) Find the area of the surface generated by revolving the curve $x = t - \sin t$ and $y = 1 - \cos t$ with $t \in [0, 2\pi]$, about the line $y = 2$.

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2. (15 points) Suppose a complex number z satisfies the equation

$$(1+z)^4 = e^{i\theta}(1-z)^4,$$

for some $\theta \in (\pi, 2\pi)$. Find the complex number z and express the result in Euler's form.

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3. (15 points) Solve the equation $x^3 - 3x^2 + 4x - 2 = 0$ given that $1 + i$ is one of the roots.

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4. (15 points) Compute

$$\frac{-i + \cos\theta + i\sin\theta}{\sin\theta + i\cos\theta},$$

where $\theta \in (\frac{\pi}{2}, \pi)$.

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5. (20 points) Let

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

(a) (10 points) Evaluate the determinant of A by the cofactor expansion.

(b) (10 points) Find all values of λ such that $\det(A - \lambda I_3) = 0$, where I_3 is the 3×3 identity matrix.

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6. (15 points) Let

$$A = \begin{pmatrix} 1 & 2 \\ 2 & 5 \end{pmatrix}.$$

(a) (8 points) Show that A is invertible and find A^{-1}.

(b) (7 points) Compute $\det(A^{-2})$.

— THE END —