MA1201 Calc & Basic Linear Algebra II (2015/16), Test-II
(60 mins)

Section: E F G H **Name:** **Student Number:**

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1. (a) (20 marks) Compute the area of the region bounded by the curves $y = x^2 - 3$ and $x = 2y$.

(b) (20 marks) Calculate the volume of the solid obtained by rotating the region bounded by $x = 3y^2$ and $x = 3y$ about y-axis.

2. (a) (15 marks) Let

$$z = -ie^{i\pi/6}$$

Write z and z^{10} in polar form with principal argument.

(b) (15 marks) Solve the equation $z^3 = 2 - 2i$ and list all the solutions in Euler form with principal argument.

3. Let

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

(a) (15 marks) Determine the values of c such that the matrix A is invertible.

(b) (15 marks) Solve the linear system $Ax = b$ by the Gaussian elimination with $c = 3$.

——————— end ———————

Not to be taken away

Brief Table of Derivatives and Integrals

Standard Derivatives	Standard Integrals
$\frac{d}{dx}(x^p) = px^{p-1}$	$\int x^p dx = \frac{x^{p+1}}{p+1} + C, \quad p \neq -1$
$\frac{d}{dx}(\ln x) = \frac{1}{x}$	$\int \frac{1}{x} dx = \ln\lvert x\rvert + C$
$\frac{d}{dx}(e^x) = e^x$	$\int e^x dx = e^x + C$
$\frac{d}{dx}(\sin x) = \cos x$	$\int \cos x \, dx = \sin x + C$
$\frac{d}{dx}(\cos x) = -\sin x$	$\int \sin x \, dx = -\cos x + C$
$\frac{d}{dx}(\tan x) = \sec^2 x$	$\int \sec^2 x \, dx = \tan x + C$
$\frac{d}{dx}(\cot x) = -\csc^2 x$	$\int \csc^2 x \, dx = -\cot x + C$
$\frac{d}{dx}(\sec x) = \sec x \tan x$	$\int \sec x \tan x \, dx = \sec x + C$
$\frac{d}{dx}(\csc x) = -\csc x \cot x$	$\int \csc x \cot x \, dx = -\csc x + C$
$\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$	$\int \frac{dx}{\sqrt{1-x^2}} = \sin^{-1} x + C$
$\frac{d}{dx}(\cos^{-1} x) = \frac{-1}{\sqrt{1-x^2}}$	
$\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$	$\int \frac{dx}{1+x^2} = \tan^{-1} x + C$

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