MA1201 (*A/B/C/D) B17/18 Test (90min) Name: _____ Student No.: _____ Marks: ____

Instruction: *Circle carefully the above course session* you register and hand your answer script together with this question paper as a cover page.* ***Marks will not be recorded without the question paper or with the wrong session you attend or circle.***

1. Compute the following elementary integrals.

   (a) $\int_0^{\pi/2} \sin^2 3x \cos 3x \; dx$ [7]

   (b) $\int \frac{4x+5}{\sqrt{2x+1}} dx$ [7]

   (c) $\int_0^2 e^{|-x+1|} dx$ [6]

2. Evaluate the following indefinite integrals.

   (a) $\int \sqrt{x^2-4} \; dx$ [12]

   (b) $\int \sqrt{x} \ln x \, dx$ [8]

   (c) $\int \frac{5x^2}{(x-2)(x^2-6x+13)} dx$ [18]

3. (a) Find the area of the region bounded by the parabola $y = 3x^2 - 2$ and the straight line $y = x$. [10]
   (b) Compute the area of the surface generated by rotating the curve segment $y = \sqrt{4-x^2}$, $0 \le x \le 1$, about the x-axis. [10]

4. (a) Determine the projection vector of $\vec{a} = \vec{\imath} + 2\vec{\jmath} + 3\vec{k}$ on $\vec{b} = -3\vec{\imath} + \vec{\jmath} - 2\vec{k}$. [8]
   (b) Find the equation of the plane containing $A(-1,0,2)$, $B(2,1,-3)$ and $C(0,1,3)$. [14]

- END -

Brief Table of Integrals

$\int x^p \, dx = \frac{x^{p+1}}{p+1} + C, \quad p \neq -1$	$\int \frac{1}{x} dx = \ln\lvert x\rvert + C$
$\int e^x \, dx = e^x + C$	$\int \sec^3 x \, dx = \frac{1}{2}\sec x \tan x + \frac{1}{2}\ln\lvert \sec x + \tan x \rvert + C$
$\int \sin x \, dx = -\cos x + C$	$\int \cos x \, dx = \sin x + C$
$\int \sec^2 x \, dx = \tan x + C$	$\int \csc^2 x \, dx = -\cot x + C$
$\int \sec x \tan x \, dx = \sec x + C$	$\int \csc x \cot x \, dx = -\csc x + C$
$\int \sec x \, dx = \ln\lvert \sec x + \tan x \rvert + C$	$\int \csc x \, dx = -\ln\lvert \csc x + \cot x \rvert + C$
$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + C$	$\int \frac{1}{1+x^2} dx = \tan^{-1} x + C$

NOT TO BE TAKEN AWAY