**MA1201 (*A/B/C/D) B16/17 Test 1(70min) Name: _____ Student No.: _____ Marks: ____**

***Instruction:*** *Indicate carefully the above course session* you register and hand in 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 indicate.***

1 (a) Find the volume of the parallelepiped with adjacent edges $\vec{a}=\vec{i}+2\vec{j}+3\vec{k}$, $\vec{b}=2\vec{i}-3\vec{k}$ and $\vec{c}=-\vec{j}+5\vec{k}$. [10]

(b) Determine the shortest distance from $C(3,-2,1)$ to the line $L$ passing through $A(1,2,3)$ and $B(-2,1,4)$; Also find the coordinates of the foot of the perpendicular from $C$ on $L$. [15]

2 Compute the following elementary integrals.

(a) $\int \tan x\,dx$ ; [10]

(b) $\int e^{-3x+1}dx$; [6]

(c) $\int_{-1}^{2} |x|\,dx$. [14]

3 Evaluate the following indefinite integrals.

(a) $\int \frac{1}{\left(4-x^2\right)^2}dx$ ; [15]

(b) $\int x^2 \tan^{-1} x\,dx$; [12]

(c) $\int \frac{-18}{(x+1)\left(x^2-4x+13\right)}dx$. [18]

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**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**