

14TH APRIL, 2020

AKPOFURE TESE

19/MHISOI/077

100 LEVEL

MEDICINE AND SURGERY

MEDICINE AND HEALTH SCIENCES

MAT 104 - GENERAL MATHEMATICS III

ASSIGNMENT

Integrate the following:

1.  $\int \frac{2x}{\sqrt{4x^2-1}} dx$

Solution

$\int \frac{2x}{\sqrt{4x^2-1}} dx \quad \text{--- (i)}$

Let  $u = 4x^2 - 1$

$\therefore \frac{du}{dx} = 8x$  and  $dx = \frac{du}{8x}$

Putting  $dx = \frac{du}{8x}$  in (i), we have:

$$\int \frac{2x}{u^{1/2}} \cdot \frac{du}{8x} = \int \frac{du}{4u^{1/2}}$$

$$\int \frac{du}{4u^{1/2}} = \int \frac{1}{4} \cdot u^{-1/2} du$$

$$\Rightarrow \frac{1}{4} u^{1/2} + C = \frac{1}{2} \sqrt{4x^2-1} + C$$

$$\int \frac{2x}{\sqrt{4x^2-1}} dx = \frac{1}{2} \sqrt{4x^2-1} + C$$

2.  $\int (\tan x)^6 \sec^2 x dx$

Solution

$$\int (\tan x)^6 \sec^2 x dx$$

Let  $u = \tan x \Rightarrow \frac{du}{dx} = \sec^2 x$



$$\therefore du = \sec^2 x dx \text{ and } dx = \frac{du}{\sec^2 x}$$

$$\int (\tan x)^6 du = \int u^6 du$$

$$\int u^6 du = \frac{u^{6+1}}{6+1} + C = \frac{u^7}{7} + C = \frac{(\tan x)^7}{7} + C$$

$$\int (\tan x)^6 \sec^2 x dx = \frac{(\tan x)^7}{7} + C$$

$$2. \int \frac{\sin^{-1} x}{\sqrt{1-x}} dx$$

Solution

$$\int \frac{\sin^{-1} x}{\sqrt{1-x}} dx$$

$$\text{Let } 1-x = u, \quad du/dx = -2x \quad dx = \frac{du}{-2x}$$

$$\int \frac{\sin^{-1} x}{u^{1/2}} \cdot \frac{du}{-2x}$$

$$\int \frac{\sin^{-1} x}{-2x} \cdot u^{-1/2} \cdot du = \frac{(\sin^{-1} x)^2}{2} + C //$$