

NAME: OBOLO FAITH IFEOLUWA

MAT NO: 19/MHS01/274

MAT 104 ASSIGNMENT.

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

Solution

$$\int \frac{2x}{(4x^2-1)^{1/2}} dx = 2 \int \frac{x}{(4x^2-1)^{1/2}} dx$$

$$u = (4x^2-1)^{1/2}$$

$$u^2 = 4x^2-1$$

$$u^2 + 1 = 4x^2$$

$$x = \sqrt{\frac{u^2+1}{4}} \quad \therefore x = \left(\frac{u^2+1}{4}\right)^{1/2}$$

$$\frac{dx}{du} = \frac{1}{2} \left(\frac{u^2+1}{4}\right)^{-1/2} \cdot \frac{u}{2}$$

$$dx = \frac{u du}{4} \left(\frac{u^2+1}{4}\right)^{-1/2}$$

$$2 \int \left(\frac{u^2+1}{4}\right)^{1/2} \cdot \frac{1}{u} \cdot \frac{u du}{4} \left(\frac{u^2+1}{4}\right)^{-1/2}$$

$$\frac{2}{4} \int \frac{u}{u} du$$

$$\frac{2}{4} \int du = \frac{1}{2} [u] + C$$

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

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

SOLUTION

$$\int \sin^{-1} x \times (\sqrt{1-x^2})^{-1} dx$$

$$u = \sin^{-1} x$$

$$\frac{du}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$du = \frac{dx}{\sqrt{1-x^2}}$$

$$du = (\sqrt{1-x^2})^{-1} dx$$

$$\int u du$$

$$\frac{u^2}{2} + C$$

$$\therefore \int \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx = \frac{(\sin^{-1} x)^2}{2} + C$$

$$3. \int (\tan x)^6 \sec^2 x dx$$

Solution

$$\text{let } u = \tan x$$

$$\frac{du}{dx} = \sec^2 x \quad du = \sec^2 x dx$$

$$\int u^6 du = \frac{u^7}{7} + C$$

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