

UWIELA JOANNA IBEJO

MATH 104

MBBS 100 level

19/MHS01/418

Integrate the following

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

soln

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

$$\frac{du}{dx} = \frac{(4x^2-1)^{-1/2} \cdot 8x}{2}$$

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

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

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

$$\frac{du}{4x} = \frac{du}{4x}$$

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

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

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

$$= \frac{1}{2} u + C$$

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

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

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

Soln) Let  $u = \sin^{-1} x$

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

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

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

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

$$\int u \cdot du$$

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

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

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

Soln

Let  $u = \tan x$

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

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

$$\int \frac{u^6 \cdot \sec^2 x \cdot du}{\sec^2 x}$$

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