$$\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx = \int u \cdot du$$

$$\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx = \frac{u^{1+1}}{1+1} + c = \frac{u^2}{2} + c$$

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

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

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

Let $u = \tan x$

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

$$\int (\tan x)^6 \sec^2 x\, dx = \int u^6 \sec^2 x \cdot dx = \int u^6 \sec^2 x \cdot \frac{du}{\sec^2 x}$$

$$\int (\tan x)^6 \sec^2 x\, dx = \int u^6 \cdot du = \frac{u^{6+1}}{6+1} + c \Rightarrow \frac{u^7}{7} + c$$

$u = \tan x$

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

Mat 104 (ASSIGNMENT)

Name: Tobby, Glory Inyang
Department: Medicine and Surgery (MBBS)
Matric Number: 19/MHS01/406
Serial Number: 008

Integrate the following:

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

Let $u = 4x^2 - 1$, $du/dx = 8x$

$\frac{du}{8x} = \frac{8x \cdot dx}{8x}$

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

$\int \frac{2x}{\sqrt{4x^2-1}} = \int \frac{2x}{\sqrt{u}} \times \frac{du}{8x}$

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

$\Rightarrow \frac{1}{4} \cdot \frac{u^{-1/2+1}}{-1/2+1} + C$

$\Rightarrow \frac{1}{4}\frac{u^{1/2}}{1/2} + C \Rightarrow \frac{1}{4} \times \frac{2}{1} u^{1/2} + C \Rightarrow \frac{1}{2} u^{1/2} + C$

$u = 4x^2 - 1$

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

$\therefore \int \frac{2x}{\sqrt{4x^2-1}} \Rightarrow \frac{1}{2}\sqrt{4x^2-1} + C.$

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

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

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

$\int \frac{\sin^{-1}x\,dx}{\sqrt{1-x^2}} \Rightarrow \int \sin^{-1}x \cdot (\sqrt{1-x^2})^{-1} dx \Rightarrow \int u \cdot (\sqrt{1-x^2})^{-1}\,dx$

$\int \frac{\sin^{-1}x}{\sqrt{1-x^2}}\,dx = \int u \cdot (\sqrt{1-x^2})^{-1} \cdot \frac{du}{(\sqrt{1-x^2})^{-1}}$