ABUBALUEZE GODDNESS EBELE
19/MHS01/101
Maths Assignment

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

Let $u = 4x^2-1$

Make x subject of formula

$\frac{u+1}{4} = \frac{4x^2}{4}$

$x = \sqrt{\frac{u+1}{4}}$

$x = \frac{\sqrt{u+1}}{2}$ or $\frac{(u+1)^{1/2}}{2}$

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

$dx = du / 4(u+1)^{1/2}$

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

$\int \frac{2x}{\sqrt{4x^2-1}} dx = \int \frac{\cancel{2}(u+1)^{1/2}}{\cancel{2}} \cdot \frac{1}{\sqrt{u}} \cdot \frac{du}{4(u+1)^{1/2}}$

$= \int \frac{1}{\sqrt{u}} \cdot \frac{du}{4}$

$= \frac{1}{4} \int \frac{1}{\sqrt{u}} du$

$\cancel{\frac{1}{4}\left[-\frac{1}{2} u^{-1/2+1}\right] + C}$

$= \frac{1}{4}\left[\frac{u^{-1/2+1}}{1/2}\right] + C$

$= \frac{1}{4} \times \left[\frac{u^{1/2}}{1/2}\right] + C$

$= \frac{2}{4}\left[u^{1/2}\right] + C$

$\frac{\cancel{2}1}{\cancel{4}2}\left[(4x^2-1)^{1/2}\right] + C$

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

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

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

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

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

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

$= \int u du$

$= \frac{u^{1+1}}{2} du$

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

$\sqrt{1-x^2}$

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

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

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

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

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

$= \frac{u^7}{7} + c$

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