NAMES: MGBOH BIYELUM EMILIA

MATRICULATION NUMBER: 19/MHS01/245

COURSE CODE: MATHS 104

ASSIGNMENT

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

SOLUTION

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

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

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

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

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

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

$= \frac{1}{2}\,du$

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

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

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

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

$\int u\,du = \frac{u^2}{2} + c$

$= \frac{(\sin^{-1}x)^2}{2}$

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

$= \int u \cdot du \qquad = \frac{u^2}{2} + c$

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

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

solution

$\int \sin^{-1}x \cdot (1-x^2)^{-1/2}\,dx$

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

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

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

$= \int u \cdot du \qquad = \frac{u^2}{2} + c$

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

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

solution

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

let $u = \tan x$

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

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

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

$= \int u^6 \cdot du$

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

$= \frac{(\tan x)^7}{7} + c$