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COURSE: MAT 104
DEPARTMENT: MBBS
MATRIC NO: 19/MHS01/343

Assignment

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

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

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

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

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

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

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

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

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

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

$= \frac{1}{2}\int du \qquad \frac{1}{2}u + C$

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

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

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

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

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

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

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

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

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

$u = \tan x$

$du = \sec^2 x\,dx$

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

Recall $u = \tan x$

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