MAT 102 ASSIGNMENT

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MATRIC NO: 19/MHS01/407

Department: Medicine & Surgery.

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

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

3. $\int (\tan x)^6 \sec^2 x\,dx \Rightarrow \frac{(\tan x)^7}{7}+C$

Answer

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

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

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

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

then

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

$2\int \frac{1}{4}\,du = \frac{1}{2}\int du$

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

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

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

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

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

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

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

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

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

let $u = \tan x$

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

then,

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

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