

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

Solution

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

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

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

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

Recall;

$$du = \frac{1}{\sqrt{1-x^2}} dx \text{ and } u = \sin^{-1} x$$

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

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

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

Solution

$$u = \tan x$$

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

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

$$\int u^6 \, du = \frac{u^{6+1}}{6+1} + C$$

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

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

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MAT 104 ASSIGNMENT

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

Solution

Let  $u = 4x^2 - 1$

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

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

Substitute  $dx = \frac{du}{8x}$  into the question

$\int \frac{2x}{u^{1/2}} \times \frac{du}{8x}$

$\int \frac{du}{4(u)^{1/2}}$

$\frac{1}{4} \int u^{-1/2} du$

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

$\frac{1}{4} \left( \frac{u^{1/2}}{1/2} \right) + C$

$\frac{1}{4} (2 \cdot u^{1/2}) + C$

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

$\frac{1}{2} (u^{1/2}) + C$

Recall;

$u = 4x^2 - 1$

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

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