MAT 104 Assignment

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Assignment

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

981.

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

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

$u^2 = 4x^2 - 1$

$2udu = 8x\,dx$

$dx = \frac{2udu}{8x}$

$u^2 = 4x^2 - 1$

$4x^2 = u^2 + 1$

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

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

$\int 2\left(\frac{u^2+1}{4}\right)^{1/2} \times \frac{1}{4} \times \frac{2udu}{8\left(\frac{u^2+1}{4}\right)^{1/2}}$

$$\int \frac{1}{g_2} du$$

$$\frac{1}{2}\int du$$

$$\int \frac{2x}{\sqrt{4x^2-1}} = \frac{1}{2} \times u + c$$

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

$$\int \frac{2x}{\sqrt{4x^2-1}} = \frac{\sqrt{4x^2-1}}{2} + c = \frac{1}{2}\sqrt{4x^2-1} + c$$

Where c is a constant for the integration

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

Soft.

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

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

$x = \sin\theta$

$$\frac{dx}{d\theta} = \cos\theta$$

$dx = \cos\theta\, d\theta$

$$\int \frac{\sin^{-1}\sin\theta}{\sqrt{1-\sin^2\theta}} \cos\theta\, d\theta$$

$$\int \frac{\theta \cos\theta}{\sqrt{\cos^2\theta}}\, d\theta$$

$$\int \frac{\theta \cos\theta}{\cos\theta}\, d\theta$$

$$= \int \theta\, d\theta$$

$$= \frac{\theta^2}{2} + c$$

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

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

where C is a constant for the integration

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

Solt.

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

Let $u = \tan x$

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

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

$\int u^6 \times \sec^2 x \times \frac{du}{\sec^2 x}$

$\int u^6\, du$

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

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

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

where C is a constant for the integration