

## Jatto Shakeerah . Maths Assignment

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Course: mat 104

Assignment

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

Soln

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

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

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

$$2udu = 8x dx$$

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

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

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

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

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

$$\int \frac{2x}{\sqrt{4x^2-1}} dx = \int \frac{2 \left( \frac{u^2+1}{4} \right)^{1/2} \cdot \frac{2udu}{8x}}{u}$$

$$\int \frac{4' du}{8}$$

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

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

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

where C is a constant for integration

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

Soln

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

$$\text{let } \theta = \sin^{-1} x$$

$$x = \sin \theta$$

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

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

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

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

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

$$\int \theta d\theta$$

$$\int \theta d\theta = \frac{\theta^2}{2} + C$$

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

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

where C is a constant for integration.

3)

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

$$\int (\tan x)^6 \overset{\text{so it}}{\sec^2 x} dx$$

$$\text{let } u = \tan x$$

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

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

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

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

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

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

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

, where C is a constant for the integration.

