ASSIGNMENT

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19/MHS01/062
Medicine and Surgery
MHS

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

Solution:

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

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

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

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

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

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

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

$$= \frac{1}{2}u + c$$

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

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

Solution:

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

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

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

$\frac{dy}{dx} =$

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

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

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

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

Solution:

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

Let $u = \tan x$

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

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

$$\int u^6\,du = \frac{(\tan x)^7}{7} + C$$

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