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Medicine and Surgery
MAT 104
19/MHS01/329

① $\int \frac{2x}{\sqrt{4x^2-1}}\,dx$

Let $4x^2-1=u$

$du = 8x\cdot dx$

$\frac{du}{4} = 2x\,dx$

$\int \frac{\frac{du}{4}}{\sqrt{u}} \cdot = \int \frac{1/4}{\sqrt{u}} \cdot du$

$= \frac{1}{4}\int \frac{1}{\sqrt{u}} \cdot du = \frac{1}{4}\int \frac{1}{u^{1/2}} \cdot du$

$= \frac{1}{4}\int u^{-1/2} \cdot du = \frac{1}{4} \cdot \frac{u^{-1/2+1}}{1/2} + c$

$= \frac{1}{4} \cdot \frac{u^{1/2}}{1/2} + c = 1/4 \times \frac{2u^{1/2}}{1}$

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

Since $u = 4x^2-1$

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

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

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

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

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

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

$$du = \left(\sqrt{1^2-x^2}\right)^{-1} dx$$

$$\int u \, du$$

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

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

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

$$u = \tan x$$

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

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

$$\int u^6 \, du$$

$$\left[\frac{u^7}{7}\right] + c$$

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