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Course Maths 104
Dept MBBS
M/N 19/mhs01/122

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

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

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

$\frac{du}{dx} = \frac{1}{2}(4x^2-1)^{-1/2} \times 8x$

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

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

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

we have

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

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

$\frac{2}{4}\left[\int 1\,du = \frac{1}{2}\left[\frac{u^{0+1}}{0+1}\right]\right] + c$

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

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

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

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

$\frac{du}{dx} = S_1$

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

$u = \tan x$

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

$\int (u^6) \times du$

$\left[\frac{u^{6+1}}{6+1} + C \right]$

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

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