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19/MHS01/272
MATH ASSIGNMENT

Solutions

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

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

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

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

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

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

$\frac{dx}{du} = u\frac{(u^2+1)^{-1/2}}{2} = \frac{u}{2\sqrt{u^2+1}}$

$dx = \frac{u\,du}{2\sqrt{u^2+1}}$

$= \int \frac{2x}{u} dx \quad 2 = 2\int \frac{x}{u} dx$

$= 2\int \frac{\sqrt{4x^2-1}}{2} \times \frac{1}{\sqrt{4x^2-1}} \times \sqrt{4x^2-1} \times \frac{du}{2\sqrt{4x^2-1}}$

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

$= \frac{1}{2}u + C, \quad = \frac{1}{2}\sqrt{4x^2-1} + c$

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

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

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

$= \int u\,du$

$= \frac{u^2}{2} + C$

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

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

Let $u = \tan x, \quad du = \sec^2 x\,dx$

$= \int (u)^6\,du$

$= \frac{[u^7]}{7} + C, \quad = \frac{(\tan x)^7}{7} + c$