MTH 104 Assignment

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

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

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

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

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

$2\int \frac{x}{u} \cdot dx$

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

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

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

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

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

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

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

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

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

$u = \tan x$

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

$u\,du = \frac{u^7}{7}$

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

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

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