David Oluomachukwu favour

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MAT 201

Assignment

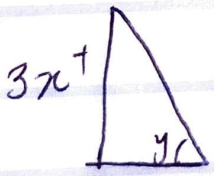
1. Find the differential of $y = \arctan 3x^4$

solution

$y = \tan^{-1} 3x^4$

$y = \frac{3x^4}{\tan}$

$\tan y = 3x^4$



$hyp^2 = opp^2 + adj^2$

$h^2 = (3x^4)^2 + 1^2$

$h^2 = 9x^8 + 1$

$h = \sqrt{9x^8 + 1}$

$\tan y = 3x^4$

$\sec^2 y = dy/dx = 12x^3$

$dy/dx = \frac{12x^3}{\sec^2 y}$

$\sec^2 y = \frac{1}{\cos y}$

$$\cos y = \frac{1}{\sqrt{9x^8 + 1}}$$

$$\sec y = \sqrt{9x^8 + 1}$$

$$\therefore \sec^2 y = \left(\sqrt{9x^8 + 1}\right)^2$$

$$= 9x^8 + 1$$

$$\frac{dy}{dx} = \frac{12x^3}{9x^8 + 1}$$

2. Find the derivative of $d = \text{arc}\sin x^2$

Solution

$$y = \sin^{-1} x^2$$

$$y = \frac{x^2}{\sin}$$

$$\sin y = x^2$$

$$\cos y = \frac{dy}{dx} = x$$

$$dy/dx = x/\cos y$$

since $\cos^2 y + \sin^2 y = 1$

$$\cos^2 y = 1 - \sin^2 y$$

$$\cos y = \sqrt{1 - \sin^2 y}$$

also $\sin y = x^2$

$$\sin^2 y = (x^2)^2 = x^4$$

$$\frac{dy}{dx} = \frac{x}{\sqrt{1-x^4}}$$