$dy/dx = dy/dt + \frac{dt}{dx}$

$= dy/dx \div dx/dt$

$dy/dt = 6t, \quad dt/dx = -3/t^3$

$dy/dx = 6t \div -3/t^3$

$= 6t + -t^3/3$

$= \frac{6t - 2}{t^2} = \frac{12}{t^2}$ //

9) $y = x^2 \cos 2x \, e^{4x}$, find dy/dx

Solution

Take log$_e$ of both sides

$\log = \ln x^2 + \ln \cos 2x + \ln e^{4x}$

Differentiate wrt x

$\frac{1}{y} dy/dx = \frac{1}{x}(2x) + \frac{1}{\cos 2x}(-2\sin 2x)$

$+4$

$\frac{1}{y} dy/dx = 2/x - \frac{2\sin 2x}{\cos 2x} + 4$

multiply both sides by y

$dy/dx = y(2/x - \frac{2\sin 2x}{\cos x} + 4)$

$= x^2 \cos 2x \, e^{4x} \, 2/x - \frac{2\sin 2x}{\cos 2x} + 4$

10) Find the derivate of y when $y = \sin(3x^2 + 5)$

Solution

$y = \sin(3x^2 + 5)$

let $u = 3x^3 + 5$

$dy/du = \cos u$

$du/dx = 9x^2$

$dy/dx = dy/du \times du/dx$

$= \cos u + 9x^2$

$= 9x^2 \cos u$

$= 9x^2 \cos 3u^3 + 5$ //