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1) Differentiate $y = \sin(6/x^2)$ from the first principle.
2) find the area under the curve given parametric equations $x = 4t^3 - t^2$ and $y = t^4 + 2t^2$, at $t = 1$ and $t = 3$
3) If $x = 4t^3 - t^2$ and $y = t^4 + 2t^2$, find dy/dx.

Solution

1 $y = \sin(6/x^2)$

$y = \sin(6/x^2)$

$f(x) = \lim_{h \to 0}$

$\frac{f(x+h) - f(x)}{h}$

$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

$y = \sin(6/x^2)$

$y = \frac{d}{dx} \frac{(6/x^2)}{h}$

$$\frac{d}{dx}\left(\frac{f}{g}\right) = \frac{\frac{d}{dx}(f) \times g - f \times \frac{d}{dx}(g)}{g^2}$$

$$\therefore y = \frac{d}{dx}\left(\frac{3e^x \sin(x)}{h}\right)$$

$$y = \frac{3}{h}$$

$$\frac{d}{dx} = 3$$

2 $x = 4t^3 - t^2$

$y = t^4 + 2t^2$

$t_1 = 1$

$t_2 = 3$

$$\vec{r} = x + y + z$$

$$\vec{r}\ 4t^3 - t^2 + t^4 + 2t^2 + 0$$

$$v = \frac{\Delta s}{\Delta t}$$

$$r = 4t^3 - t^2 + t^4 + 2t^2 + 0$$

$$r = 4t^3 + 2t^2 - t^2 + t^4$$

when $t = 1$

$$= 4(1)^3 + 2(1)^2 - (1)^2 + (1)^4$$

$$= 4(1)^3 + 2(1)^2 - 2^6$$

$$x = 4^{-1}$$

$$x_1 = 1/4$$

Where $t_2 = 3$

$4(3)^3 + 2(3)^2 - (3)^2 + (3)^4$

$4(3)^3 + 2(3)^2 - 6^6$

$4(9) + 2(6) - 6^6$

$36 + 12 - 36$

$x_2 = 12$

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3) If $x = 4t^3 - t^2$ and $y = t^4 + 2t^2$, find dy/dx.

$\frac{d}{dx}$

Solution

$x = 4t^3 - t^2$

$y = t^4 + 2t^2$