

33 find the coordinates of points where $f(x)$ has horizontal tangent. $f(x) = x^4 - 4x^3 + 9$.

$f(x)$ has horizontal tangent when $f'(x) = 0$.

$$\rightarrow f'(x) = 4x^3 - 12x^2 = 0$$

$$x^2(4x - 12) = 0$$

$$\text{either } \boxed{x = 0} \text{ or } 4x - 12 = 0 \rightarrow 4x = 12 \rightarrow x = 3$$

~~$4x - 12 = 0 \rightarrow 4x = 12 \rightarrow x = 3$~~

\therefore points: $(0, f(0)) = (0, 9)$

~~$(3, f(3)) = (3, -18)$~~

~~$4 - \frac{4}{27} = \frac{70}{81}$~~

$(3, f(3)) = (3, -18)$

51 The demand for q of a product depends on the price according to

$$q = \frac{1000}{\sqrt{p}} - 1 \text{ for } p > 0$$

Find and explain the meaning of the instantaneous rate of change with respect to price when the price is

(a) 25

the rate of change = q'

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