

23a) $f(x) = x^2$

$$\frac{f(a+h) - f(a)}{h} = \frac{(a+h)^2 - a^2}{h}$$

$$= \frac{a^2 + 2ah + h^2 - a^2}{h} = \frac{h(2a+h)}{h} = 2a+h$$

b) $f(x) = \frac{1}{x}$

A.R.O.C. on $[x, x+h]$ $\frac{f(x+h) - f(x)}{(x+h) - x}$

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$$\frac{f(x+h) - f(x)}{h} = \frac{\frac{1}{x(x+h)} - \frac{1}{x(x+h)}}{h}$$

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

$$= \frac{\frac{x - x - h}{x(x+h)}}{h} = \frac{\frac{-h}{x(x+h)}}{h} = \frac{-1}{x(x+h)}$$

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24a) $y = 40t - 16t^2$

$$25 = 40t - 16t^2$$

$$-16t^2 + 40t - 25 = 0$$

$$(-4t + 5)(4t - 5) = 0$$

$$t = \frac{5}{4} \quad \left[t = \frac{5}{4} \right] (\rho)$$

b) Profit = $(100x - 0.5x^2) - (60x + 300)$

$$= -0.5x^2 + 40x - 300$$

$$-0.5x^2 + 40x - 300 = 300$$

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$$-0.5x^2 + 40x - 600 = 0$$

$$x^2 - 80x + 1200 = 0$$

$$(x - 20)(x - 60) = 0$$

$$\boxed{x = 20} \text{ or } \boxed{x = 60}$$

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