Name: SOLUTIONS
Stu#:

(1) [7 points] Let $f(x) = 3 + 4x - x^2$. Evaluate and simplify the difference quotient

$$\frac{f(4+h) - f(4)}{h}$$

$$\frac{f(4+h) - f(4)}{h} = \frac{1}{h}\left[f(4+h) - f(4)\right]$$

$$= \frac{1}{h}\left[\left(3 + 4(4+h) - (4+h)^2\right) - \left(3 + 4(4) - (4)^2\right)\right]$$

$$= \frac{1}{h}\left[\cancel{3} + \cancel{16} + 4h - \cancel{16} - 8h - h^2 - \cancel{3} - \cancel{16} + \cancel{16}\right]$$

$$= \frac{h(-4-h)}{h}$$

$$= \boxed{-4-h}$$

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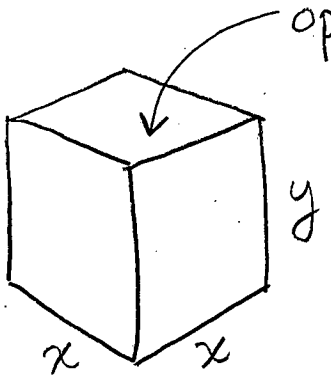
(2) [8 points] An open rectangular box has a volume of 5 m^3 and a square base of side length x. Express the surface area S of the box as a function of x.



$$x^2 y = 5$$

$$\therefore y = \frac{5}{x^2}$$

$$S = x^2 + 4xy$$

$$= x^2 + 4x\left(\frac{5}{x^2}\right)$$

$$= \boxed{x^2 + \frac{20}{x}}, \quad x > 0$$