

Calculus 7-3

1. area of circle = πr^2

$$A = \pi r^2$$

$$A' = 2\pi r$$

$$A'(5) = 2\pi \cdot 5 \\ = 10\pi$$

2. $V = 1000 \left(1 - \frac{t}{60}\right)^2, 0 \leq t \leq 60$

$$V' = 1000 (2) \left(1 - \frac{t}{60}\right) \left(-\frac{1}{60}\right)$$

$$= -\frac{2000}{60} \left(1 - \frac{t}{60}\right)$$

$$= -\frac{2000}{360} + \frac{5 \cdot 2000t}{3600}$$

$$= -\frac{300}{9} + \frac{5t}{9}$$

$$= -\frac{300 + 5t}{9}$$

$$V'(10) = \frac{-300 + 5(10)}{9}$$

$$= \frac{-300 + 50}{9}$$

$$= \frac{-250}{9} \text{ L/min}$$

3. a) $\frac{\Delta m}{\Delta x} = \frac{f(1.1) - f(1)}{0.1} = \frac{\sqrt{1.1} - \sqrt{1}}{0.1} = \frac{1.0488 - 1}{0.1} = 0.488 \text{ kg/m}$

b) $f = \sqrt{x}$
 $f' = \frac{1}{2}x^{-\frac{1}{2}}$
 $= \frac{1}{2\sqrt{x}}$

$$f'(1) = \frac{1}{2\sqrt{1}} = \frac{1}{2} \text{ kg/m}$$

4. $f = x + \frac{1}{2}x^2$
 $f' = 1 + \frac{1}{2} \cdot 2x$
 $= 1 + x$

$$f'(6) = 1 + 6 \\ = 7 \text{ g/cm}$$

7-3 cont.

5. $n = 1000 + 180t + 25t^2 + 3t^3$

$$n' = 180 + 50t + 9t^2$$

$$n'(3) = 180 + 50(3) + 9(3)^2$$

$$= 180 + 150 + 81$$

$$= 411 \text{ badenia per hr.}$$