

pg. 137 #2, 4, 7, 8, 27

2. a. $A = \pi r^2$

$$C = d \cdot \pi \Rightarrow d = \frac{C}{\pi}$$

$$2r = \frac{C}{\pi}$$

$$r = \frac{C}{2\pi}$$

so $A = \pi \left(\frac{C}{2\pi} \right)^2$

$$= \frac{\pi \cdot C^2}{4\pi^2}$$

$$= \frac{C^2}{4\pi}$$

b. $\frac{d}{dC} A = \frac{1}{4\pi} \cdot 2 \cdot C$

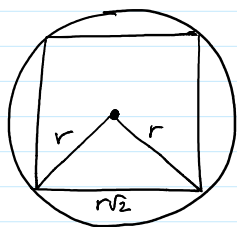
$$A' = \frac{C}{2\pi} \frac{\text{in}^2}{\text{in}}$$

c. A' at $C = \pi$ is $\frac{\pi}{2\pi} = \frac{1}{2} \frac{\text{in}^2}{\text{in}}$

A' at $C = 6\pi$ is $\frac{6\pi}{2\pi} = 3 \frac{\text{in}^2}{\text{in}}$

d. $\frac{\text{in}^2}{\text{in}}$

4.



a. $A = (r\sqrt{2})^2 = 2r^2$

b. $A' = 4r \text{ in}^2/\text{in}$

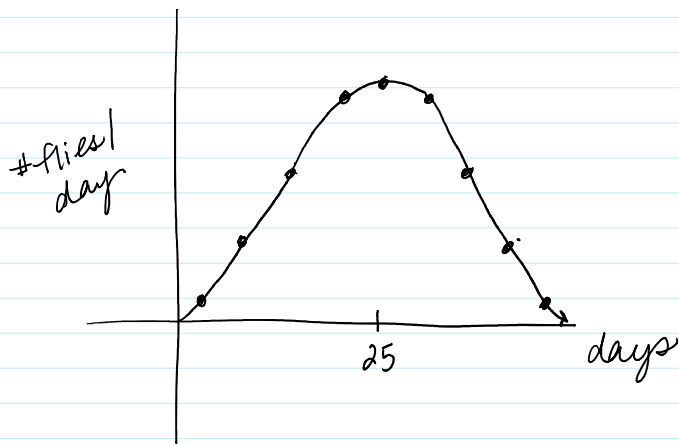
c. $A'(1) = 4 \text{ in}^2/\text{in}$

$A'(8) = 32 \text{ in}^2/\text{in}$

d. Sq inches / in

7. a.

$p'(t)$ = change in population



- b. Increases fastest around day 25
Increases slowest at 0 and 50 days

$$8. Q(t) = 200(30-t)^2 = 200(900 - 60t + t^2) = 18000 - 12000t + 200t^2$$

How fast is the water running out at the end of 10 min? \Rightarrow Instantaneous

$$Q'(t) = -12000 + 400t \quad \text{gal/min}$$

$$Q'(10) = -12000 + 400 \cdot 10 = -8000 \quad \text{gal/min.}$$

$$\text{Average ROC} = \frac{Q(10) - Q(0)}{10 - 0} = \frac{-82000 - 18000}{10} = -10,000 \quad \text{gal/min}$$

$$27. C(x) = 2000 + 100x - 0.1x^2$$

$$a. \text{ Avg cost} = \frac{C(100) - C(0)}{100 - 0} = \frac{11,000 - 2,000}{100} = 90 \quad \$/\text{machine}$$

$$b. \text{ Marginal cost} = C'(x) = 100 - 0.2x$$

$$C'(100) = 80 \quad \$/\text{machine}$$

$$c. C(101) = 11,079.9 \approx 11,000 + 80$$