

NAME: \_\_\_\_\_

AM 034

Brown University  
Homework, Set 6

Fall 2004  
Due Friday November 5, 2004

6.1 # 4 §9.5 in B & D

6.2 # 7 §9.5 in B & D (involves Example 1)

6.3 # 8 §9.5 in B & D (involves Example 1)

6.4 **Hunting:** Hunting is considered to have indiscriminate impact on rabbit populations. To determine the impact on the system as a whole, assume hunting reduces the rate of change in a population by a constant time the population (i.e.—constant effort harvesting). Then we have

$$\begin{aligned}x' &= (a - h_1)x - bxy \\y' &= -(c + h_2)y + dxy,\end{aligned}$$

where  $h_1$  and  $h_2$  are the hunting constants ( $> 0$ ).

- (a) What effect does this have on the population of prey? What effect does this have on the average population?
- (b) Assume the hunting is done selectively, as in shooting only rabbits or lynx. Then  $h_1 = 0$  and  $h_2 > 0$  or  $h_2 = 0$  and  $h_1 > 0$ . What effect does this have on the populations and average populations of predator and prey?
- (c) In a rural county, foxes prey mainly on rabbits but occasionally include a chicken in their diet. The farmers decide to put a stop to the chicken killing by hunting the foxes. What do you predict will happen? What happens to the farmers' gardens?

6.5 Explain the difference between

$$\begin{aligned}x' &= (1 - x - Ay)x \\y' &= (1 - y - Bx)y\end{aligned}$$

and

$$\begin{aligned}x' &= (1 - x + Ay)x \\y' &= (1 - y + Bx)y.\end{aligned}$$

Give an example when this might occur in nature.