

## 5.5 Handout

**Tips:**

- Remember: a per capita rate needs to be multiplied by the population to get an honest growth rate.
- There are *two* state variables now (not just one). Thus, there are two differential equations in any given problem.
- Euler's method still works for a system of DE; just with more book-keeping.

1. Consider the following types of predator-prey interactions. Write the associated system of autonomous differential equations.

(a) per capita growth of prey =  $1 - 0.05p$ , per capita growth of predators =  $1 + 0.001b$

(b) per capita growth of prey =  $2 - 0.0001p^2$ , per capita growth of predators =  $-1 + 0.01b$

2. Write down a system of DE for the disease model where people who recover become immune.

3. For the predator-prey system in problem 1a, run one step of Euler's method with  $\Delta t = 0.5$  and initial conditions  $p(0) = 5$ ,  $b(0) = 50$ .