

## Population ecology worksheet 1: Introductory concepts

*Finish by Fri 25 Jan at 4:00 PM; you don't actually need to turn it in to anyone, this is for practice.*

*Some of these are intentionally tricky, so it's probably OK if you're confused. Use the opportunity to try to get the ideas straight in your head.*

1. A population is growing geometrically, according to the equation  $N_T = N_0\lambda^T$ . Describe the behaviour of the population in the following cases:

a.  $\lambda > 1$

b.  $0 < \lambda < 1$

c.  $\lambda < 0$

d. Choose *two* of these three cases. For each, pick parameters for the dandelion spreadsheet to give you  $\lambda$  in the right range, and make a graph on the spreadsheet that shows the population doing what you say.

2. A population is growing exponentially, according to the equation  $N(t) = N(0)\exp(rt)$ . Describe the behaviour of the population in the following cases:

a.  $r < 0$

b.  $r > 0$

c.  $r > 1$

3. If Niagara Falls moves backward by 6cm/month, how many years will it take to move 1km? Use this question to practice cancelling units.

4. A population of bacteria is growing exponentially at the rate 0.7/day. How long will it take its density to increase from 20/ml to 100/ml?

5. The state of Wisconsin specifies that gypsy moth control efforts will be implemented in an area when the estimated density of pupae reaches 100/ha. If the estimated 2015 density in a particular county was 10/ha, and each year each adult female lays 600 eggs, of which (on average) 1/400 survive to become an adult female, in what year do you expect the province to begin control efforts in that county?