Examples 5.1 – Exponential Growth and Decay

1. In 1950, both Lineville and Powertown had populations of 1000 people. The population of Lineville was increasing by a constant 50 people per year, while the population of Powertown was increasing by a constant 5% per year. Write models for these populations, and then view their graphs on the same set of axes in the window $[0, 20] \times [1000, 2650]$

   Solution:

Years after 1950	Population of Lineville	Population of Powertown
0		
1		
2		
…	…	…
t		
30		

2. Write a discrete model for each situation.

   (a) Colony *A* begins with 250 bacteria and grows by 11% per day.

   (b) Colony *B* begins with 675 bacteria and declines by 9% per day.

   Solution:

   (a)

   (b)

3. Which is the better deal: 6.25% annual interest compounded monthly, or 6.20% annual interest compounded continuously? (Advertised rates are usually called **nominal rates**.)

   Solution: We write a model for each option and compute the annual rate after the effects of compounding (i.e., the **effective rate**):

   Option 1:

   Option 2: