

1. You start with a 100g lump of a radioactive isotope. A year later the lump has a mass of 97.7g. What is the half life of the isotope?

2. At time  $t = 0$  minutes, a colony of E. coli has 10000 cells. The population is growing exponentially, and after 60 minutes it has 90000 members. Find a function of the form

$$p(t) = C 10^{at}$$

that describes the population size.

3. The function  $f(x) = 2^{-3x}$  can be written in the form  $f(x) = 10^{-ax}$  for a certain constant  $a$ . Determine the value of  $a$ .

4. Use the change of base formula to rewrite  $\log_{10}(7)$  in terms of the natural logarithm,  $\ln$ .

5. Solve the following equation for  $x$ :

$$\ln(x) + \ln(x - 1) = 2.$$

6. Find the inverse function of  $f(x) = 1 + \sqrt{2 - 3x}$ . Remember:

- a) Write  $y = f(x)$ .
- b) Solve for  $x$ .
- c) The resulting expression in terms of  $y$  is  $f^{-1}(y)$ .