Math 199 CD2: Exponential Growth and Decay

September 24, 2021

1. Assume that the number of bacteria in a culture grows exponentially with a growth constant of 0.02, time being measured in hours. (Although the number of bacteria must be a nonnegative integer, the assumption that the number is a continuous quantity always seems to lead to results that are experimentally verified.)

   (a) How many bacteria will be present after 1 hour if there are initially 1000?

   (b) Given the same initial 1000 bacteria, in how many hours will there be 100 000 bacteria?

2. Solve the following differential equations given that the graph of each solution goes through the point (0,10).

   (a) $\dfrac{ds}{dt} = 12s$

   (b) $\dfrac{ds}{dt} = -2s$