# Assignment 2

Math 345, Prof. Shi

Due: Wednesday , Sept 20 (11am)

1. Textbook page 16, 1.7
2. Textbook page 16, 1.8(a,b)
3. A relatively simple equation modeling the growth of solid tumors is given by the Gompertz growth law $\frac{dN}{dt} = re^{-at}N$ where $N(t)$ denotes the tumor cell population at time $t$.
   (a) Give a reason for considering the growth rate to be $re^{-at}$.
   (b) Find an explicit solution assuming $r = 10$, $a = 1$, and $N(0) = 1$. What is the long term behavior of the tumor growth?
   (c) Find the solution in the general situation (assuming $r$, $a$ arbitrary parameters and $N(0) = N_0$).
4. A population is observed to obey the Logistic equation with eventual population 20,000. The initial population is 1000, and 8 hours later, the observed population is 1200. Find the reproductive rate and the time required for the population to reach 75% of its carry capacity.