Math 105 91A[1] March 8th, 19100 Worksheet 11

http://www.math.ubc.ca/~ athreya/105 Sections 17.6,7

1. If $\frac{dy}{dx} = xe^{-y}$, then find y.

Ans: $y = \ln(\frac{x^2}{2} + C)$ for some constant C.

2.(*Logistic growth*) If the number N of individuals in a population at time t follows logistic growth then $\frac{dN}{dt} = 3(6 - N)N$. Find a relationship between N and t.

Ans: Discussed in the textbook.

3. Many chemical reactions are the result of an intercation of two molecules that undergo a change to produce a new product. The rate of reaction typically depends on the concentration of the two kinds of molecules. If 1gms is the amount of substance A and b is the amount of substance 2gms at time $t = 0$ and if x is the amount of product at time t, then the rate of formation of x maybe given by the differential equation

$$\frac{dx}{dt} = 3(1 - x)(2 - x),$$

where k is a positive constant. Find a relation between x and t if there is no product in the begining.

Typo: *Ans* to 3 in W10 should be $P < 1$ is convergent.

[1] **Office hours:** Monday:1:30-2:30pm, 3-4pm, Tuesday:11:30-12:30 am, 3:30-4:30 pm, Wednesday: 10:30-11:30 am