Mathematics 172

Quiz # 17 Name: Key

You must show your work to get full credit.

Let a population grow by the discrete dynamical system

$$N_{t+1} = 3N_t e^{1-\frac{N_t}{100}}$$

1. If $N_0 = 190$ find N_1 and N_2

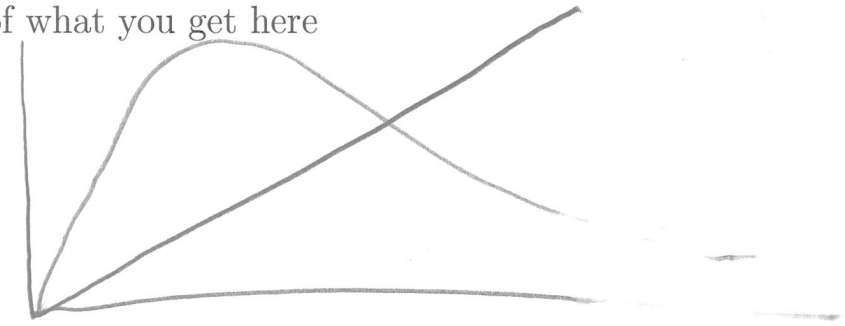
$N_1 =$ 231.7

$N_1 = 3(190)e^{1-\frac{190}{100}} = 231.7$

$N_2 =$ 186.2

$N_2 = 3(231.7)e^{1-\frac{231.7}{100}} = 186.2$

2. Plot $y = 3xe^{1-x/100}$ and $y = x$ on your calculator with `Xmin =0` and `Xmax =300`. Make a sketch of what you get here



The use 2nd CALC `intersect` to find the equilibrium points of the dynamical system.

Equilibrium points are 0, 209.86

3. Use 2nd CALC `dy/dx` to determine if the equilibrium points are stable or unstable.

The stable point(s) are _____

The unstable point(s) are 0, 209.86

$\frac{dy}{dx} = -1.084$ at $N_t = 209.86$

Thus unstable