Mathematics 172

Quiz 4 Name: Key

You must show your work to get full credit.

In this quiz we will analyse the following rate equation:

$$\frac{dN}{dt} = .05N(N-2)(10-N).$$

1. If $N(3) = 8$ what is $N'(3)$. $N'(3) =$ 4.8

$N'(3) = .05\,N(3)\,(N(3)-2)(10-N(3))$

$= .05\,(8)(8-2)(10-8) = 4.8$

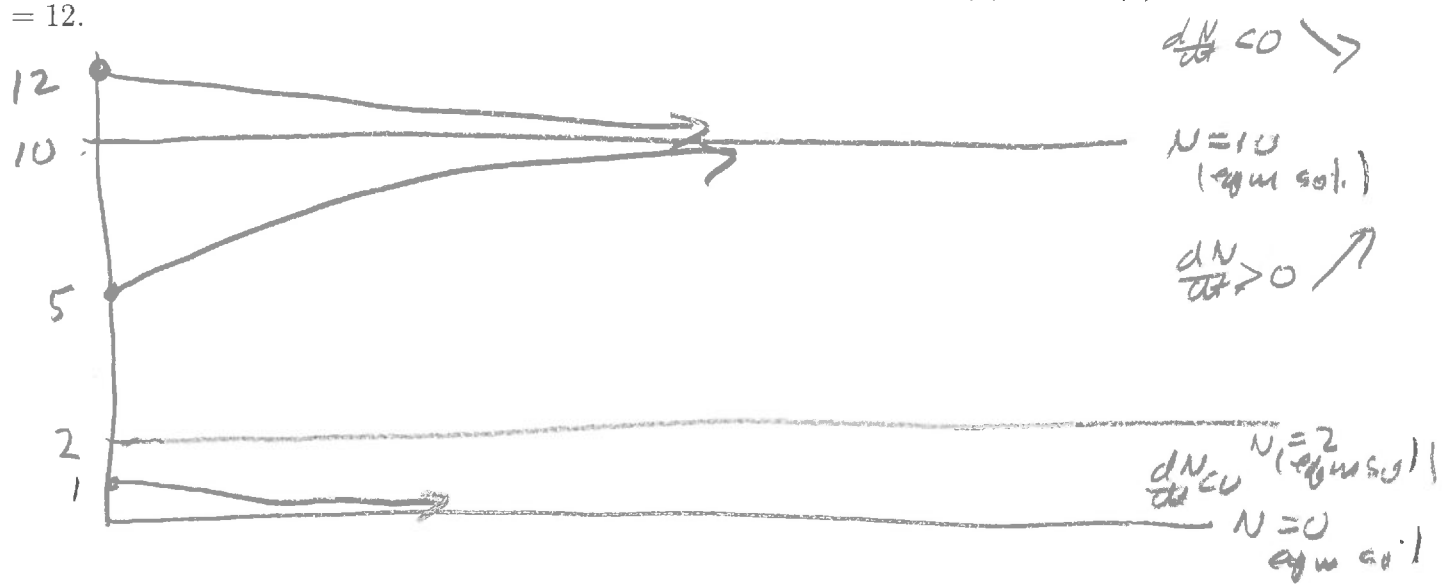
2. What are the equilibrium points? The equilibrium points are: 0, 2, 10

For an equilibrium point $\frac{dN}{dt} = 0$, thus

solve $.05N(N-2)(10-N) = 0$

to get $N = 0, 2, 10$

3. Make a graph showing the equilibrium points and the solutions with $N(0) = 1$, $N(0) = 5$ and $N(0) = 12$.



4. For the solution with $N(0) = 12$ estimate $N(79)$. $N(79) \approx$ 10