Mathematics 172

Quiz 3 Name: Key

You must show your work to get full credit.

Consider the rate equation

$$\frac{dy}{dt} = .15y\left(1 - \frac{y}{20}\right).$$

1. If $y(0) = 7$ find $y'(0)$. $y'(0) =$ .6825

$y'(0) = .15y(0)\left(1 - \frac{y(0)}{20}\right) = .15(7)\left(1 - \frac{7}{20}\right) = .6828$

2. If $y(3.4) = 22$ find $y'(3.4)$. $y'(3.4) =$ -.33

$y'(3.4) = .15y(3.4)\left(1 - \frac{y(3.4)}{20}\right) = .15(22)\left(1 - \frac{22}{20}\right) = -.33$

3. Find the constant solutions (which we will be calling the ***equilibrium solutions***). The constant solutions are: 0, 20

For y constant we have $\frac{dy}{dt} = 0$ so solve

$0 = .15y\left(1 - \frac{y}{20}\right)$

which has solutions $y = 0, y = 20$

4. Make a graph that shows all the constant solutions, the solution with $y(0) = 10$ and the solution with $y(0) = 22$.