Mathematics 172

Quiz 15 Name: Key

You must show your work to get full credit.

For the rate equation

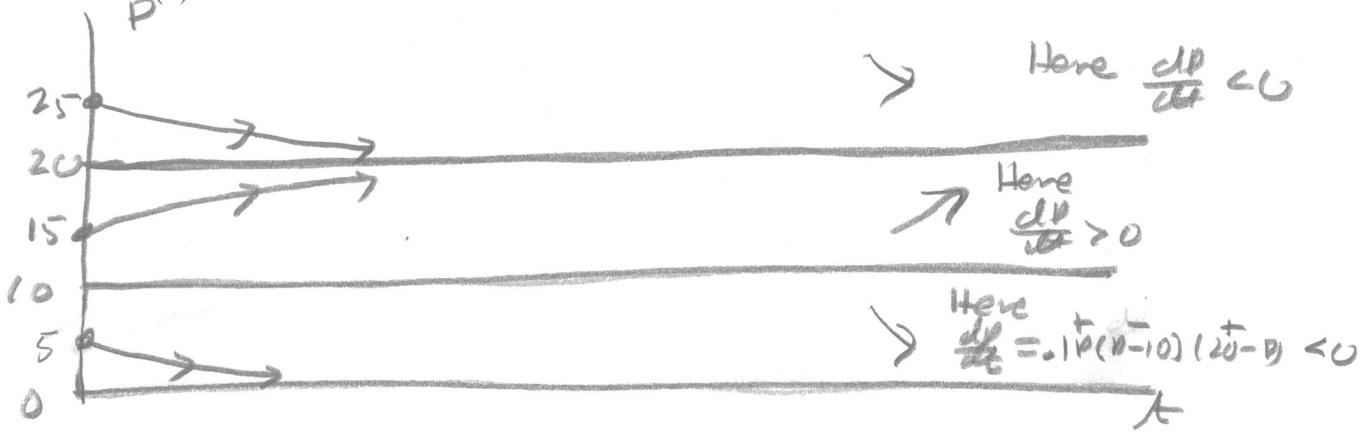
$$\frac{dP}{dt} = .1P(P-10)(20-P)$$

1. Find the equilibrium solutions.

Set $\frac{dP}{dt} = .1P(P-10)(20-P) = 0$ to get $P = 0, 10, 20$

Equilibrium solutions are: 0, 10, 20

2. Draw a graph showing the equilibrium solutions and the solutions with initial values $P(0) = 5$, $P(0) = 15$ and $P(0) = 25$.



3. Which of the equation points are stable? Stable points are: 0, 20

0 is stable as solutions are attracted to it

20 is stable as solutions are attracted to it

4. Give the following estimates:

If $P(0) = 5$ then $P(100) \approx$ 0

If $P(0) = 15$ then $P(100) \approx$ 20

If $P(0) = 25$ then $P(100) \approx$ 20