MTH 291, Quiz #7, Spring 2018 Name KEY

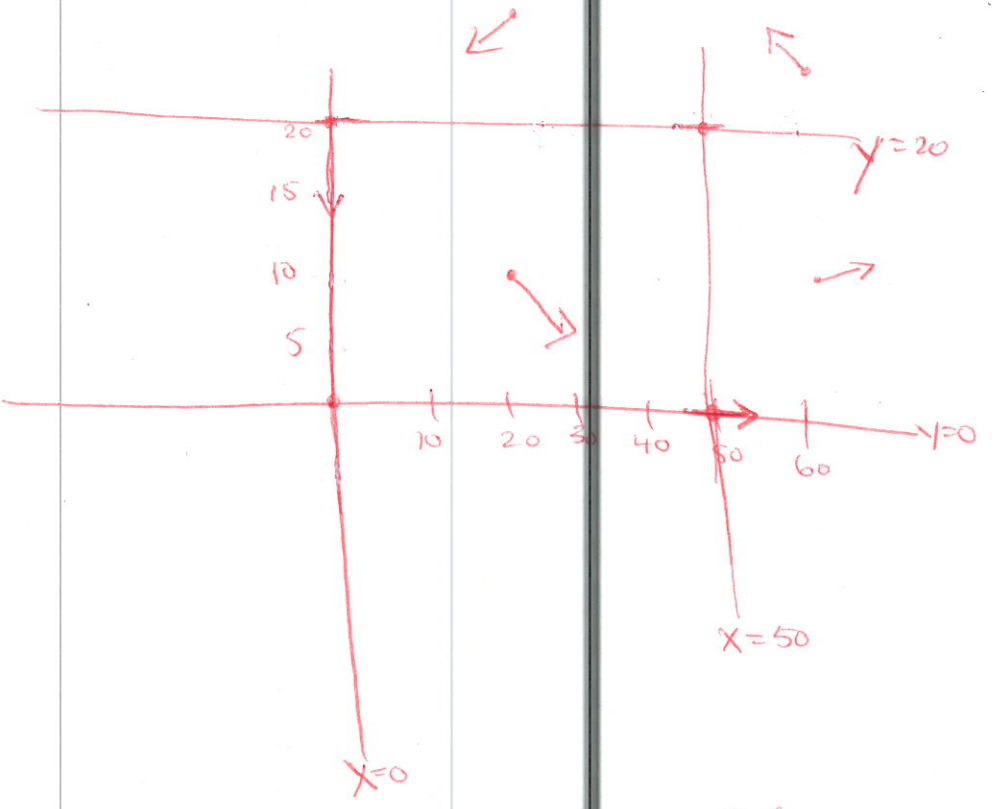
Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Consider the system of differential equations $\begin{cases} \frac{dx}{dt} = 0.8x - 0.04xy \\ \frac{dy}{dt} = -0.3y + 0.006xy \end{cases}$, $x(0) = 55, y(0) = 10.$

   Find the nullclines and graph them. Use that information to determine the general properties of the slope field. Can you characterize the behavior of any equilibria? Explain.

$\frac{dx}{dt} = .04x(20 - y) = 0$ $x=0$ $y=20$

$\frac{dy}{dt} = .006y(-50 + x) = 0$ $y=0$ $x=50$



$x=60, y=10$

$\frac{dx}{dt} = 24$ $\frac{dy}{dt} = .6$

$x=60, y=25$

$\frac{dx}{dt} = -12$ $\frac{dy}{dt} = 1.5$

$x=20, y=10$

$\frac{dx}{dt} = 8$ $\frac{dy}{dt} = -1.8$

$x=20, y=30$

$\frac{dx}{dt} = -8$ $\frac{dy}{dt} = -5.4$

Predator-prey

(50, 20) should be stable