

Math 2080: Differential Equations
Worksheet 8.2: Linearization and steady-state analysis

NAME:

1. Consider the following model:
$$\begin{cases} X' = X(1 - X) - XY \\ Y' = Y\left(\frac{4}{5} - \frac{3}{5}Y\right) - XY. \end{cases}$$

(a) Describe what this system could model.

(b) Find the nullclines and sketch them on the XY -plane.

(c) Find all steady-state solutions.

- (d) Linearize the system at each steady-state solution (X^*, Y^*) and determine the behavior of the system when $X \approx X^*$ and $Y \approx Y^*$.