

$$\left. \begin{aligned} \frac{dx}{dt} &= 4x - 2xy \\ \frac{dy}{dt} &= -3y + 3xy \end{aligned} \right\} \begin{array}{l} \text{Predator-Prey system} \\ x(t), y(t) \\ \text{Lotka-Volterra System} \end{array}$$

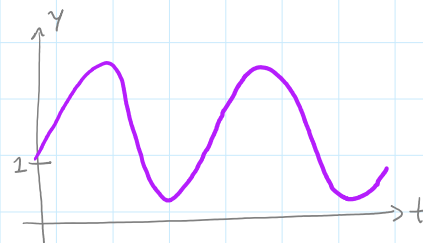
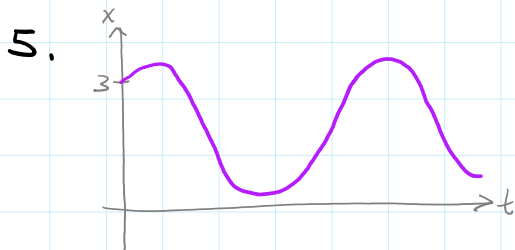
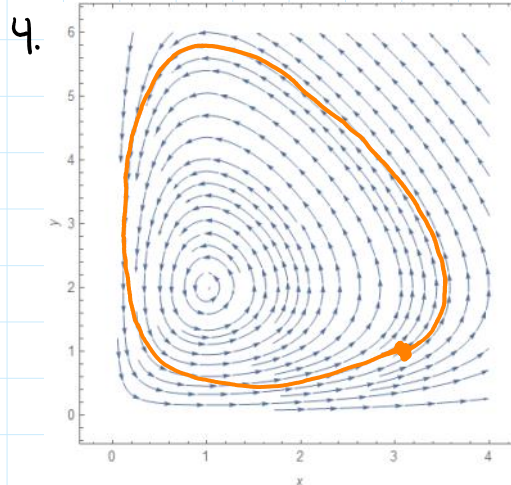
1. x — prey, y — predators

$$\begin{aligned} 0 &= 4x - 2xy & \Rightarrow & \quad 0 = 2x(2 - y) \\ 0 &= -3y + 3xy & \Rightarrow & \quad 0 = 3y(x - 1) \end{aligned}$$

Equilibrium solutions: $(0,0)$, $(1,2)$

3. If $x(0) = 3$, $y(0) = 1$, then

$$\frac{dx}{dt} > 0, \quad \frac{dy}{dt} > 0$$



$$\frac{dx}{dt} = 2x \left(1 - \frac{x}{3}\right) - xy$$

$$\frac{dy}{dt} = 3y \left(1 - \frac{y}{5}\right) - 3xy$$

1. Competing

2. FACTOR!

$$\begin{aligned} x \left(2 - \frac{2}{3}x - y\right) &= 0 \\ 3y \left(1 - \frac{y}{5} - x\right) &= 0 \end{aligned}$$

$$\left. \begin{aligned} 2 - \frac{2}{3}x - y &= 0 \\ 1 - \frac{y}{5} - x &= 0 \end{aligned} \right\}$$

$$(x, y) = (0, 0), (0, 5), (3, 0), \left(\frac{9}{13}, \frac{20}{13}\right)$$