1. A competing species model is given by the following. Assume quantities are in thousands.

\[ x' = (36 - 2x - 3y)x \]
\[ y' = (24 - 2x - y)y \]

(a) Find the stationary solutions and analyze the behavior around each.
(b) Draw a reasonable family of solutions.
(c) Describe (full sentences!) the various possible outcomes for a starting scenario where both populations are small.
(d) If the populations are at the stationary solution in the first quadrant, why does it seem real-world reasonable that there are essentially two directions of instability? What do they correspond to?

2. A cooperating species model is given by the following. Assume quantities are in thousands.

\[ x' = (27 - 3x + y)x \]
\[ y' = (27 + 3x - 2y)y \]

(a) Find the stationary solutions and analyze the behavior around each.
(b) Draw a reasonable family of solutions.
(c) Why does it seem real-world reasonable that a population such as \((1, 100)\) would undergo a massive decrease in \(y\) but with very little change in \(x\) before stabilizing?