Competing Species (7.3)

For problems **1**–**2**,

- **a.** Find all critical points.
- **b.** For each critical point, find the corresponding linear system.
- **c.** Find eigenvalues of each linear system, and determine the stability/instability of each critical point.
- **d.** Draw a phase portrait for the nonlinear system.
- **e.** Determine the limiting behavior of x and y and as $t \to \infty$ and interpret the results in terms of the populations of the two species.

1. $dx/dt = x(1.5 - x - 0.5y), \quad dy/dt = y(2 - y - 0.75x)$

2. $dx/dt = x(1 - x - y), \quad dy/dt = y(1.5 - y - x)$