

MA 507-51 Chapter 7	Assignment 6	score	Name: _____ 4 December 2000
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INSTRUCTIONS: Work these problems (on a separate sheet if you like).

The following system of equations can be interpreted as describing the interaction of two species with populations x and y .

$$\begin{aligned} x' &= x(1.5 - 0.5x - y) \\ y' &= y(2 - y - 1.125x) \end{aligned}$$

We want to determine what type of interaction there is between the two species.

1. Find all of the critical points.
2. For each critical point find the corresponding system of linear differential equations; classify each critical point as to type and determine whether the system is asymptotically stable, stable, or unstable there.
3. Compute and plot (e.g., with Maple) enough trajectories of the system to clearly show the behaviour of the solutions. You can do this superimposed on a direction field plot if you like.
4. Describe the limiting behaviour of x and y as $t \rightarrow \infty$. Is this system an example of competitive cooperation? competitive exclusion?