

Review problems

Ex 3 p 16, Ex 11 p 18, Ex 12 p 18, Ex 2 p 37

Ex 1 p 57, Ex 2 p 58, Ex 6 p 59, Ex 1 p 72

Ex 5 p 105, Ex 1 p 135, Ex 1 p 156, Ex 1 p 184

Ex 2 p 185, Ex 7 p 186, Ex 4 p 242, Ex 6 p 212

Ex 8 p 213, Midterm I & Midterm II

Exercise: A model for the interaction of two species competing for the same resources of food or/and space, represented by the variables x and y is driven by the following system:

$$\begin{cases} x' = x - x^2 - xy \\ y' = \frac{y}{2} - \frac{y^2}{4} - \frac{3}{4}xy \end{cases}$$

a) Determine all equilibrium points

b) Compute the Jacobian matrix and give the linearized problem near each equilibrium point

c) Find the eigenvalues/eigenvectors of each linearized system. Determine the types of each equilibria and specify its stability/unstability.

d) Draw the phase portrait

e) Describe in words the long-time behavior of the 2 species. Stress whether they can survive together