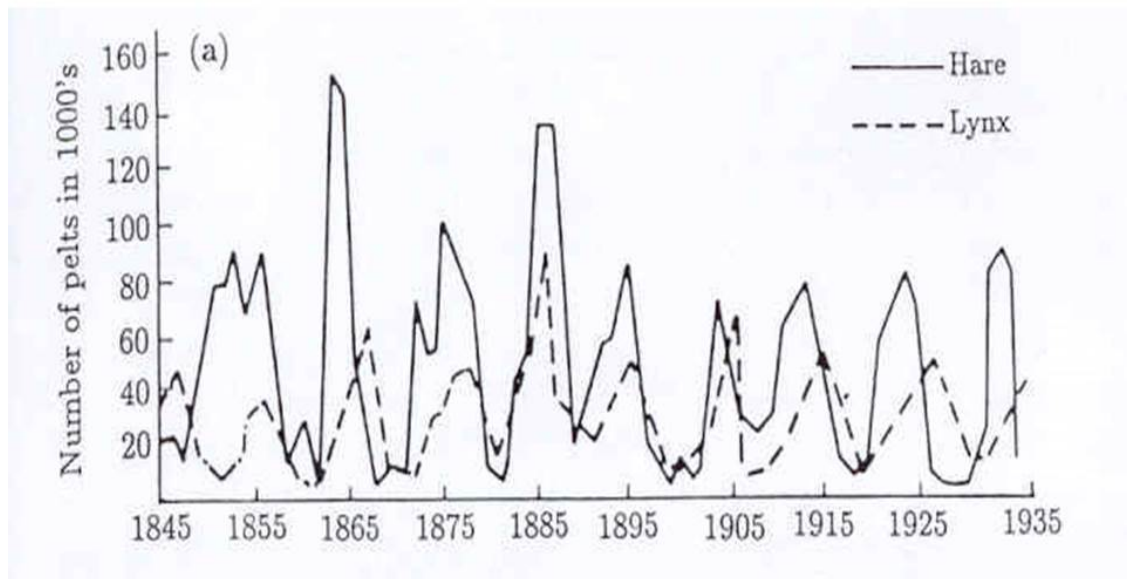**Pattern Formation - Homework 2**   **Deadline: October 29, 6PM**

(1) **Hare-lynx data analysis** (20pt)

The data presented in Fig.1 below shows the changes in the abundance of the lynx and the snowshoe hare in the Artic Canada, as indicated by the number of pelts received by the Hudson Bay Company (D.A. McLulich. *Fluctuations in the Numbers of Varuina Hare.* Univ. of Toronto Press. 1937)

i) Consider the simplest equations describing the hare-lynx population dynamics (as discussed in the lecture) and fit the parameters so that the solution would describe the Hudson Bay data reasonably well.

ii) Where from do the uncertainties (fluctuations) come in the data?

iii) Estimate the amplitude of the noise that should be added to the equations in order to improve the agreement with the observation.

(2) **Finite food supply for the hare** (20pt)

i) Consider the hare-lynx problem and note that the simplest equations have the problem that without the lynx the hare population goes to infinity. It cannot happen since the food supply for the hare is finite. How should you modify the equations in order to correct the problem?

ii) Without solving the new equations, try to draw a qualitative picture about the fix-point and flow structure of the solution. Verify your guess by calculating the fixed points.