

Tehtävä 1 on kotitehtävä . Kotitehtävät palautetaan laskuharjoituksiin mennessä huoneen Y323b edessä sijaitsevaan lokeroon tai laskuharjoitusten alussa assistentille.

1. (Problem 4.10 p.181)
2. Consider continuation of branch of periodic orbits starting from Hopf bifurcation. Use normal form of the Hopf-bifurcation to obtain better initial guess than (1.10 p.189).
3. (Problem 3.3 p.46) The following is known as the McMillan map :

$$\phi\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} y \\ -x + 2y\left(\frac{\mu}{1+y^2} + \epsilon\right) \end{bmatrix},$$

where $\mu = 2$ and $\epsilon = 0.05$. The origin is a fixed point and it is a saddle. Find the approximations of its stable and unstable manifolds.

4. (Problem 4.1. p.52) The system

$$\begin{cases} x' = -2x + y^2 \\ y' = -x + y \end{cases}$$

has two equilibria: the origin and the point $\mathbf{p} = (2, 2)$. Study their stable and unstable manifolds.

5. (Problem 3.1. p.44) Show (by induction) that knowing the values of a symmetric k -linear map on the diagonal is sufficient for fixing the map uniquely.