

**Week 10 Worksheet: Fixed points and linear stability**

To receive credit, hand in as many solved practice problems as time permits. Try unfinished problems at home. Solution of this worksheet will be made available on the website.

1. **(Demonstration)** Find all the fixed points of  $\dot{x} = x^2 - 1$  and classify their stability.
2. **(Demonstration)** Review the following example from lecture: find all the fixed points of  $\dot{x} = x(3 - x - 2y)$ ,  $\dot{y} = y(2 - x - y)$  and classify their stability.
3. **(Practice)** Find all the fixed points of the following odes and classify their stability:
  - (a)  $\dot{x} = 4x^2 - 16$
  - (b)  $\dot{x} = \sin x$
  - (c)  $\dot{x} = x^2(6 - x)$
4. **(Practice)** Find all the fixed points of  $\dot{x} = x(3 - 2x - y)$ ,  $\dot{y} = y(2 - x - y)$  and classify their stability.