

Math 454 (2021) Assignment 2
(Due: Thursday, September 30, 2021. in class)

1. (30pts) For each of the following scalar ordinary differential equations draw a qualitatively accurate bifurcation diagram (you may use graphical software) labeling all bifurcation points (μ^*, x^*) and the type of bifurcation (SN,TC,PF). State (μ^*, x^*) exactly. Solid=stable, dashed=unstable.

$$a) \quad \dot{x} = \mu - \frac{x^2}{x^2 + 1} \quad (1)$$

$$b) \quad \dot{x} = (x - 1)(x - \mu) \quad (2)$$

$$c) \quad \dot{x} = (x - 1)(\mu - 2x + x^2) \quad (3)$$

$$d) \quad \dot{x} = x(\mu + x - x^2) \quad (4)$$

$$e) \quad \dot{x} = \mu + x - x^3 \quad (5)$$