

Due 03.05.2023.

Name and surname: _____

Student number: _____

1. (10 points) Consider the differential equation $\frac{dx}{dt} = 1 + rx + x^2$, where r is a parameter.
 - (a) Find the fixed points in terms of r .
 - (b) For what values of r are there no fixed points?
 - (c) Sketch a bifurcation diagram, carefully labeling the stability of the fixed points. Classify the bifurcation.
2. (30 points) Perform a bifurcation analysis, and classify the type of bifurcation that occurs, on each of the following differential equations. Assume that r is a parameter.
 - (a) $\frac{dx}{dt} = 5 - re^{-x^2}$
 - (b) $\frac{dx}{dt} = rx - \log(1 + x)$
 - (c) $\frac{dx}{dt} = r - x - e^{-x}$

END
