ESE 617/MEAM 613: Nonlinear Systems & Control (Fall 2019)

Homework #9

Due on 11/13/2019, 9 a.m., in class

1. Consider the system

$$\dot{y} = ay^2 - z^2$$
$$\dot{z} = -z + y^2 + yz$$

Using the center manifold theory, determine the stability of the origin when

1.1 $a \neq 0$ (5 points),

1.2 $a = 0$ (5 points).

2. (10 points) Determine the stability of the origin of the following system using the center manifold theory

$$\dot{y}_1 = -y_2 + y_1 z$$
$$\dot{y}_2 = y_1 + y_2 z$$
$$\dot{z} = -z - y_1^2 - y_2^2 + z^2$$