**Homework 6, ECE 1675/2570 Robotic Control, Spring 2022**
**(Due Wednesday March 23)**

**Problem 1.** Please read the supplemental material on hybrid systems and write down the approximate amount of time that you spent in reading that document.

**Problem 2.** Consider a second-order system

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}2 & 3\\ -1 & 4\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 2\end{bmatrix}u$$
$$y = \begin{bmatrix}2 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}.$$

(a) Please check its observability.
(b) Please design an observer whose dynamics can be characterized by a second-order system with natural frequency of 5 and damping ratio of 0.8.