



Name:

ID#:

Duration: 20 mins.

Problem 1

Discretize the following system by obtaining the discrete time state space representation at $T = 1$.

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -4 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$
$$y(t) = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Solution

Problem 2

Obtain the state-space representation of the following system in the **Controllable** canonical form and draw the state diagram.

$$\frac{Y(z)}{U(z)} = \frac{z}{z^2 + 8z + 5}$$

Solution

