Dr. Mustak E. Yalcin

Circuit and System Analysis

Exercise for Week-1

1. Given the system

$$\frac{d}{dt}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 6 & -2 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} e, \quad y = \begin{bmatrix} 1 & -1 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

   (a) Find the transfer function $H(jw) = Y(jw)/E(jw)$
   (b) Draw the $|H(jw)|$ and $\angle H(jw)$
   (c) Obtain the output for $e(t) = \cos(2t + \frac{\pi}{2}) - \sin(2t + \frac{\pi}{3})$
   (d) Confirm the result which is obtained in (c) using a computer program such as MATLAB.