Quiz 4

<u>Problem 1</u>: Consider the following linearized model in deviation form:

$$\frac{dX}{dt} = AX + BU \tag{1}$$

where

$$X = \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} \tag{2}$$

$$A = \begin{bmatrix} -1 & 0 \\ 2 & -2 \end{bmatrix} \tag{3}$$

$$B = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix} \tag{4}$$

and

$$U = \begin{bmatrix} U_1 \\ U_2 \end{bmatrix} \tag{5}$$

Suppose the input undergoes the following change:

$$U_1 = \begin{cases} 0 & t < 0 \\ 3 & t \geq 0 \end{cases} \tag{6}$$

$$U_2 = \begin{cases} 0 & t < 0 \\ 3.t & t \geq 0 \end{cases} \tag{7}$$

Compute how the X vector changes with time when $t \geq 0$. Assume that the system is at steady state when $t = 0$.