Home Assignment 3

Problem 1: Compute e^{At} for the following A matrices:

1.
$$A = \begin{bmatrix} 1 & 2 \\ 3 & 8 \end{bmatrix}$$

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

3.
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & -5 & 7 \\ -6 & -3 & -2 \end{bmatrix}$$

4.
$$A = \begin{bmatrix} 2 & 0 & 0 \\ 5 & 2 & 0 \\ 8 & 4 & 2 \end{bmatrix}$$

5.
$$A = \begin{bmatrix} k_1 & 0 \\ k_1 & k_2 \end{bmatrix}$$

Problem 2: A process in modeled in deviation form as

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

Compute the unforced dynamics for each A matrix given in Problem 1. Assume that at $t = 0$, each element of the vector $X(0)$ is equal to 1.