Let 2. Example 2.7

Q. controllability? Find sequence $x(2)=\begin{bmatrix}1\\1.2\end{bmatrix}$ (origin)

$A=\begin{bmatrix}1&1\\0&1\end{bmatrix}$ $B=\begin{bmatrix}0\\1\end{bmatrix}$ $x(0)=0$

Solution ① controllability

$W_c=[B\ \ AB]=\begin{bmatrix}0&1\\1&1\end{bmatrix}$ $|W_c|=-1\neq 0$

controllable full rank.

② find sequence

$x(N)=A^N x(0)+W_c U$

$x(2)=\begin{bmatrix}0&1\\1&1\end{bmatrix}\begin{bmatrix}u(1)\\u(0)\end{bmatrix}=\begin{bmatrix}1\\1.2\end{bmatrix}$

$u(0)=1$

$u(1)+u(0)=1.2$ $\Rightarrow$ $\begin{cases}u(0)=1\\u(1)=0.2\end{cases}$