IWS$_2$

Topic: ***Check of properties of controllability and observability by E. Gilbert's criteria***

Tack Investigate a dynamic system on controllability and observability by E. Gilbert criteria if the mathematical description of a system is given in the state-space in the following look:

$$\begin{cases} \dot{x} = Ax + Bu \\ y = Cx \end{cases},$$

where matrix A, B, C are matrixes with constant coefficients (on variants).

Variants:

1)

$$A = \begin{vmatrix} 2 & -1 \\ -1 & 2 \end{vmatrix},\ B = \begin{vmatrix} 4 \\ -3 \end{vmatrix},\ C = \begin{vmatrix} -1 \\ 3 \end{vmatrix}.$$

2)

$$A = \begin{vmatrix} 10 & 11 \\ 14 & 13 \end{vmatrix},\ B = \begin{vmatrix} -1 \\ 1 \end{vmatrix},\ C = \begin{vmatrix} 1 \\ 2 \end{vmatrix}.$$

3)

$$A = \begin{vmatrix} 3 & 4 \\ 6 & 5 \end{vmatrix},\ B = \begin{vmatrix} 1 \\ -1 \end{vmatrix},\ C = \begin{vmatrix} 0 \\ 1 \end{vmatrix}.$$

4)

$$A = \begin{vmatrix} -5 & 2 \\ 4 & -7 \end{vmatrix},\ B = \begin{vmatrix} -1 \\ 2 \end{vmatrix},\ C = \begin{vmatrix} -1 \\ 2 \end{vmatrix}.$$

5)

$$A = \begin{vmatrix} 1 & 3 \\ 7 & 5 \end{vmatrix},\quad B = \begin{vmatrix} -1 \\ 3 \end{vmatrix},\ C = \begin{vmatrix} 2 \\ 4 \end{vmatrix}.$$

6)

$$A = \begin{vmatrix} -5 & 3 \\ 3 & -5 \end{vmatrix},\ B = \begin{vmatrix} 1 \\ 3 \end{vmatrix},\quad C = \begin{vmatrix} -1 \\ 2 \end{vmatrix}.$$

7)

$$A=\begin{vmatrix}9 & 9\\ 2 & 6\end{vmatrix},\ B=\begin{vmatrix}-2\\ -3\end{vmatrix},\ C=\begin{vmatrix}3\\ -4\end{vmatrix}.$$

8)

$$A=\begin{vmatrix}2 & 3\\ -1 & 6\end{vmatrix},\ B=\begin{vmatrix}1\\ -2\end{vmatrix},\ C=\begin{vmatrix}-3\\ 2\end{vmatrix}.$$

9)

$$A=\begin{vmatrix}-8 & 15\\ 2 & -7\end{vmatrix},\ B=\begin{vmatrix}5\\ 6\end{vmatrix},\ C=\begin{vmatrix}-1\\ -2\end{vmatrix}.$$

10)

$$A=\begin{vmatrix}7 & 2\\ 4 & 5\end{vmatrix},\ B=\begin{vmatrix}2\\ 1\end{vmatrix},\ C=\begin{vmatrix}0\\ 1\end{vmatrix}.$$

11)

$$A=\begin{vmatrix}7 & 9\\ 6 & 4\end{vmatrix},\ B=\begin{vmatrix}-1\\ 0\end{vmatrix},\ C=\begin{vmatrix}2\\ 0\end{vmatrix}.$$

12)

$$A=\begin{vmatrix}5 & 6\\ 8 & 7\end{vmatrix},\ B=\begin{vmatrix}1\\ 3\end{vmatrix},\ C=\begin{vmatrix}2\\ -1\end{vmatrix}.$$