

Canonical Forms (8A)

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Controller Canonical Form

$$G(s) = \frac{s^2 + 7s + 2}{s^3 + 9s^2 + 26s + 24}$$

$$\mathbf{A} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -24 & -26 & -9 \end{bmatrix} \quad \mathbf{b} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

$$\mathbf{C} = [2 \ 7 \ 1] \quad d = 0$$

$$\mathbf{A} = \begin{bmatrix} -9 & -26 & -24 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \quad \mathbf{b} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

$$\mathbf{C} = [1 \ 7 \ 2] \quad d = 0$$

Observer Canonical Form

$$G(s) = \frac{s^2 + 7s + 2}{s^3 + 9s^2 + 26s + 24}$$

$$\mathbf{A} = \begin{bmatrix} -9 & 1 & 0 \\ -26 & 0 & 1 \\ -24 & 0 & 0 \end{bmatrix}$$

$$\mathbf{b} = \begin{bmatrix} 1 \\ 7 \\ 2 \end{bmatrix}$$

$$\mathbf{C} = [1 \ 0 \ 0]$$

$$d = 0$$

$$\mathbf{A} = \begin{bmatrix} 0 & 0 & -24 \\ 1 & 0 & -26 \\ 0 & 0 & -9 \end{bmatrix}$$

$$\mathbf{b} = \begin{bmatrix} 2 \\ 7 \\ 1 \end{bmatrix}$$

$$\mathbf{C} = [0 \ 0 \ 1]$$

$$d = 0$$

References

- [1] <http://en.wikipedia.org/>
- [2] M.L. Boas, "Mathematical Methods in the Physical Sciences"
- [3] E. Kreyszig, "Advanced Engineering Mathematics"
- [4] D. G. Zill, W. S. Wright, "Advanced Engineering Mathematics"