

## Example: Converting a Controllable System to CCF

Step 2: Determine desired  $\mathcal{C}(\bar{A}, \bar{B})$ .

We need to figure out  $\bar{A}$  and  $\bar{B}$ .

For CCF, we must have

$$\bar{A} = \begin{pmatrix} 0 & 1 \\ -a_2 & -a_1 \end{pmatrix}, \quad \bar{B} = \begin{pmatrix} 0 \\ 1 \end{pmatrix},$$

so we need to find the coefficients  $a_1, a_2$ .

Recall: the characteristic polynomial does not change:

$$\begin{aligned} \det(Is - A) &= \det(Is - \bar{A}) \\ \det \begin{pmatrix} s + 15 & -8 \\ 15 & s - 7 \end{pmatrix} &= \det \begin{pmatrix} s & -1 \\ a_2 & s + a_1 \end{pmatrix} \\ (s + 15)(s - 7) + 120 &= s(s + a_1) + a_2 \\ s^2 + 8s + 15 &= s^2 + a_1s + a_2 \end{aligned}$$