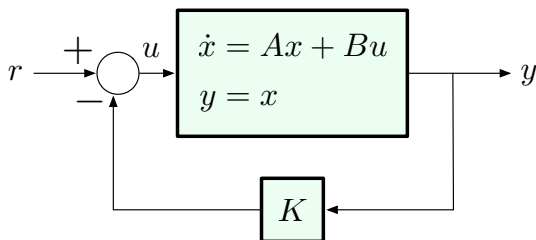# Pole Placement via State Feedback

Let's also add a reference input:

$$\dot{x} = Ax + B(-Kx + r) = (A - BK)x + Br, \qquad y = x$$

Take the Laplace transform:

$$sX(s) = (A - BK)X(s) + BR(s), \ Y(s) = X(s)$$
$$Y(s) = \underbrace{(Is - A + BK)^{-1}B}_{G} R(s)$$

Closed-loop poles are the eigenvalues of $A - BK$!!