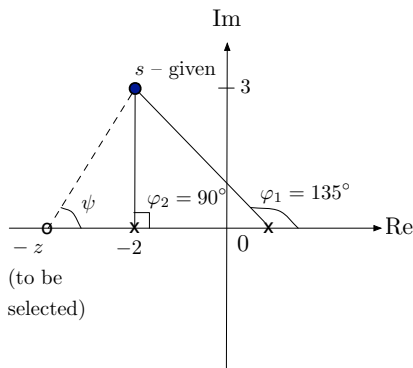# Pole Placement via RL

Let $\quad G_p(s) = \dfrac{1}{s-1}, \qquad G_c(s) = K\dfrac{s+z}{s+p}$

Problem: given $p = 2$, find K and z to place poles at $-2 \pm 3j$.

Desired characteristic polynomial:

$$(s+2)^2 + 9 = s^2 + 4s + 13, \qquad \text{damping ratio } \zeta = \dfrac{2}{\sqrt{13}} \approx 0.555$$

Must have

$$\underbrace{\psi}_{\substack{\text{angle from} \\ s \text{ to zero}}} - \sum_i \underbrace{\varphi_i}_{\substack{\text{angles from} \\ s \text{ to poles}}} = 180°$$

So, we want $\psi = 180° + \sum_i \varphi_i$