Double Integrator with PD-Control

Characteristic equation: $1 + K \cdot \dfrac{s+1}{s^2} = 0$

Here we can still write out the roots explicitly:

$$s^2 + Ks + K = 0 \qquad \Longrightarrow \qquad s = \frac{-K \pm \sqrt{K^2 - 4K}}{2}$$

But let's actually draw the RL using the rules:

Rule A: 2 branches

Rule B: both start at $s = 0$

Rule C: one ends at $z_1 = -1$, the other at ∞

Rule D: one branch will go off to $-\infty$

Rule E: asymptote angles at 180°

Rule F: no $j\omega$-crossings except for $s = p_1 = p_2 = 0$