Approximate PI via Lag Compensation

$$G_c(s) = K\frac{s+z}{s+p},\ p < z \qquad\qquad G_p(s) = \frac{1}{s-1}$$

How good is this controller?

Tracking a constant reference: assuming closed-loop stability, the FVT gives

$$e(\infty) = \frac{1}{1+G_c(s)G_p(s)}\Big|_{s=0} = \frac{1}{1+K\frac{s+z}{(s+p)(s-1)}}\Big|_{s=0} = \frac{1}{1-\frac{Kz}{p}}$$

Check for stability: no RHP poles for $\dfrac{1}{1+G_c(s)G_p(s)}$

$$(s+p)(s-1)+K(s+z)=0$$
$$s^2+(K+p-1)s+Kz-p=0$$

Conditions for stability: $K > 1-p,\ Kz > p$