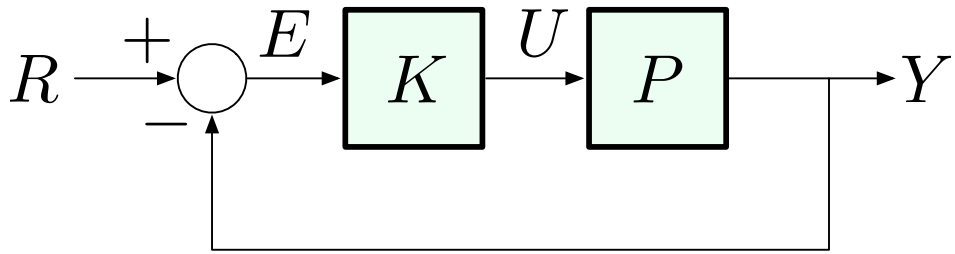
System Type

The fact that $1/s$ leads to perfect tracking of constant references and perfect rejection of constant disturbances is a special case of a more general analysis.



Consider the reference $r(t) = \dfrac{t^k}{k!}1(t) \quad \longleftrightarrow \quad R(s) = \dfrac{1}{s^{k+1}}$

Error signal: $E = \dfrac{1}{1+KP}R = \dfrac{1}{1+KP}\dfrac{1}{s^{k+1}}$

FVT gives (assuming stability):

$$e(\infty) = sE(s)\Big|_{s=0} = \frac{1}{1+KP}\frac{1}{s^k}\Bigg|_{s=0}$$

— let's see how the forward gain affects tracking performance.