(3) minimize settling time: determined by slow pole aka $(s+1)$ the pole at -1.

This corresponds to a time domain element of e^{-t}.

In 20 seconds, this decays to $2 \cdot 10^{-9}$ which is much less than required value of 0.01 from target of 1.

$K=1$ is original T.F. already good enough!!!

(4) Integral Controller $\frac{K_I}{s}$: $\dfrac{\frac{K_I}{s} \cdot G}{1+\frac{K_I}{s} \cdot G}$ = closed loop T.F.

$$\frac{K_I G}{s + K_I G} = \frac{K_I \cdot 1000\left(s+\frac{1}{10}\right)}{s(s+1)(s+100) + K_I \cdot 1000\left(s+\frac{1}{10}\right)}$$

Now $\lim_{t \to \infty} e(t) = \lim_{s \to 0} s \cdot E(s) = \lim_{s \to 0} sR(1-T) = \underbrace{\lim_{s \to 0} 1-T}_{\text{step input}}$

$$= \lim_{s \to 0} \left(1 - \frac{K_I 1000 \cancel{\left(s+\frac{1}{10}\right)}\,\frac{1}{10}}{\underbrace{\cancel{s(s+1)(s+100)}}_{0} + K_I \cdot 1000 \underbrace{\cancel{\left(s+\frac{1}{10}\right)}}_{\frac{1}{10}}}\right)$$

$$= \lim_{s \to 0} \left(1 - \frac{100 K_I}{100 K_I}\right) = 0$$

Any value of K_I works so pick something like 10?

Controller $D = \boxed{\dfrac{10}{s}}$