Consider the control system in Fig. 1. A PD controller should be designed to achieve the mixed $H_2/H_\infty$ optimal tracking under the bounded plant perturbation $\Delta P(s)$

$$|\Delta P(s)| \leq \left| \frac{0.5}{s^2 + 0.1s + 10} \right|$$

In this homework, you need to design $k_1$ and $k_3$ which can satisfied both $H_2$ and $H_\infty$ tracking performance. Moreover, you need to sketched two figure to verify the correctness of your design.(Fig. 3.7 and Fig. 3.8 in textbook)

**Hint :** Example 3.1. in textbook.

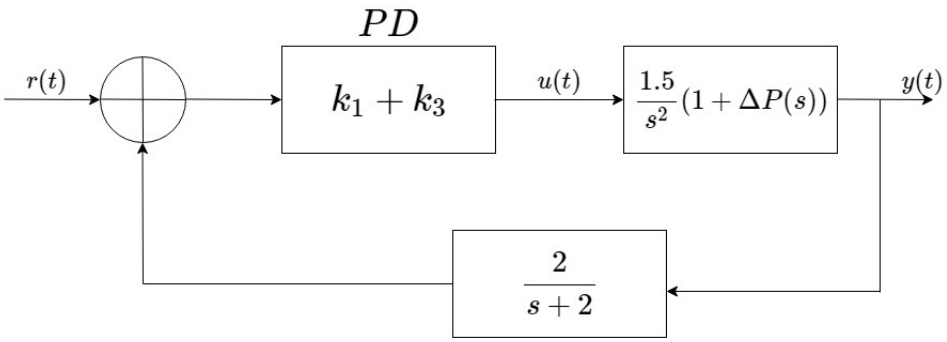


Fig. 1: PD contorl system that suffers from plant perturbation