1. A schematic solenoid coil is shown below with $R = 200\Omega$ and $L = 1H$. Let the voltage u be the input and the current i be the output. Determine the settling time t_s of the coil if its initial condition is zero.

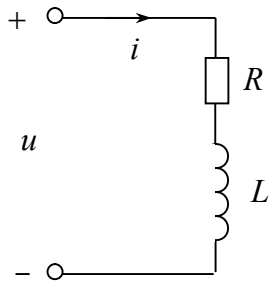

Figure 1. **Solenoid coil**

2. A block diagram of a first-order system is shown in Figure 2, where $G(s) = 10/(0.2s+1)$. It is required that, by utilizing negative feedback, the settling time t_s is ten times less than the open-loop system $G(s)$, while keeping the gain unchanged (=10). Determine the design parameters K_H and K_0.

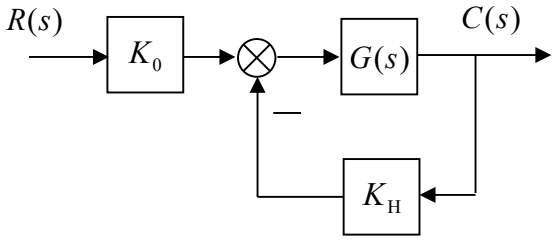

Figure 2

3. Mathematical model of a thermometer can be described by

$$\frac{1}{(Ts+1)}.$$

If water temperature measured by the **thermometer shows that it needs one minute to reach 98% of the actual water temperature, determine the time constant** T.