1. A frequency-domain network with an unknown load $Z$ is shown in Fig. P1. If $I_s = 2 \angle 0^\circ$ A, please find the impedance of $Z$ so that the amplitude of the terminal voltage $V$ has a maximum value. (15 分)

![Fig. P1](image)

2. The dc circuit in Fig. P2 has $V_s = 20 \Omega \times i_s$. Please find $i_1$ and $i_2$. (20 分)

![Fig. P2](image)

3. (a) The circuit in Fig. P3 has $i_s = 1$ A, $L=1$ H, and $C=0.5$ F. Please find $i_1$, $i_2$, and $v_n$, under dc steady-state conditions. (6 分)

(b) Following part (a), if $i_s = -1$ A for $t > t_i$, (i.e. $i_s$ changes polarity at $t_i$), please find $i_1(t^+_i)$, $i_2(t^+_i)$, and $v_n(t^+_i)$. (9 分)

![Fig. P3](image)
4. For the circuit shown in Fig. P4, the switch is originally open before \( t=0 \). At \( t=0 \), the switch is closed. Find \( v(t) \) and \( i(t) \) for \( t>0 \) (20 分)

![Fig. P4](image)

5. Determine the voltage \( V_o \) in the circuit of Fig. P5 (15 分)

![Fig. P5](image)

6. For the Sallen-Key low-pass filter shown in Fig. P6, find the transfer function

\[
H(s) = \frac{V_{out}(s)}{V_{in}(s)} \] (15 分)

![Fig. P6](image)