1. Calculate the equivalent resistance $R_{ab}$ shown in Fig. P1 (10分)

![Diagram of Fig. P1 with resistances and labels](image)

2. Find $v_o$ and $i_o$ in the circuit of Fig. P2 (20分)

![Diagram of Fig. P2 with labels and annotations](image)

3. For the circuit shown in Fig. P3 (總分 20分)
   (a) What resistor connected across terminals a-b will absorb maximum power from the circuit? (12分)
   (b) What is that power? (8分)

![Diagram of Fig. P3 with labels and annotations](image)
4. Find the equivalent input impedance, $Z$, for the circuit of Fig. P4. Let the impedance of the capacitor be $(j\omega C_1)^{-1}$. (10分)

![Fig. P4](image)

5. In Fig. P5, the source voltage $V_s = 10\angle 0^\circ$ and delivers 10VA to the load, i.e., $Z_{in}(6+j8)$. If the power factor is 0.707 (pf angle is 45°). Find the known impedance $Z$. (10分) In addition, if the power factor is expected to be raised to unity by paralleling a capacitor, find the impedance of the capacitor. (10分)

![Fig. P5](image)

6. The input to the circuit in Fig. P6 is $v_i(t)$, the output is $v_o(t)$ across the capacitor. Determine (a) the step response (10分) and (b) the impulse response of the circuit. (10分)

![Fig. P6](image)