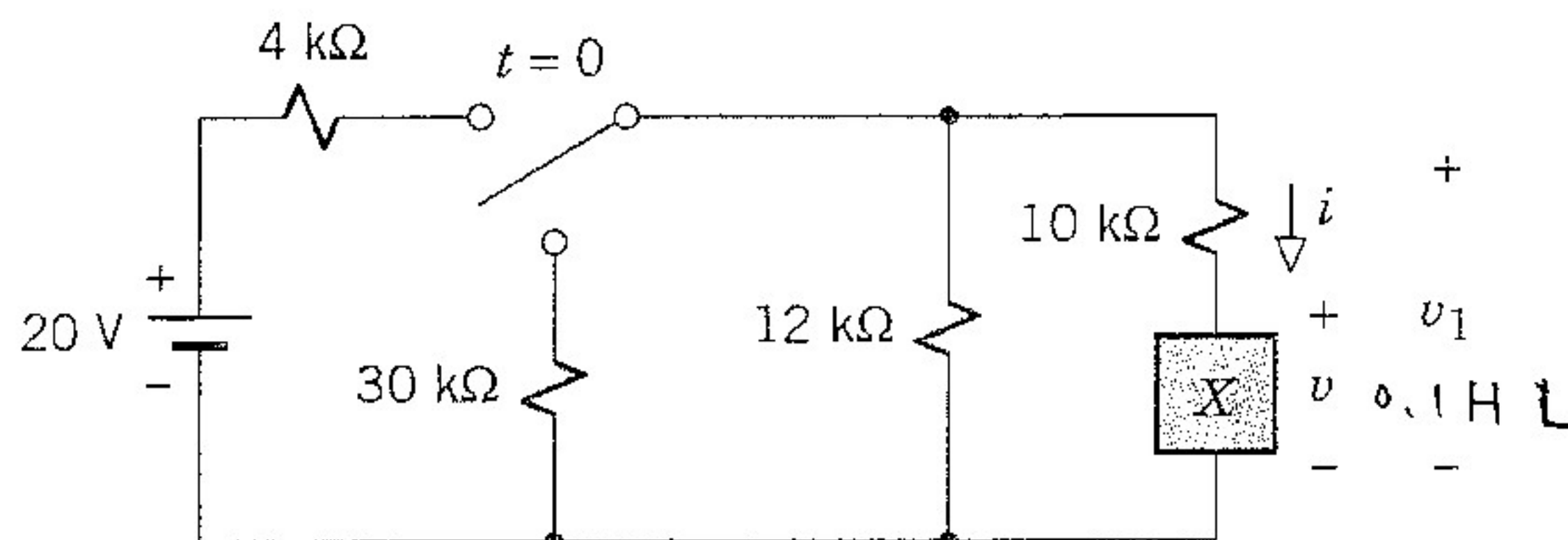1. In the circuit below, the switch has been in the lower position a long time before $t = 0$. At $t = 0$, it is switched to the upper position. Find $i(t)$ and $v_1(t)$ for $t > 0$, if element X is a 0.1-H inductor. (30%)

2. The following circuit is used for a flash lamp with $R_1 = 2$ kΩ, $C = 1000$ μF, $v_s = 100u(t)$ V, and the lamp resistance $R_2 = 8$ Ω. If the circuit is switched to position 2 at $t = 20$ s to discharge, plot the capacitor voltage $v(t)$ versus time and calculate the peak charging and discharging currents i, respectively. (30%)
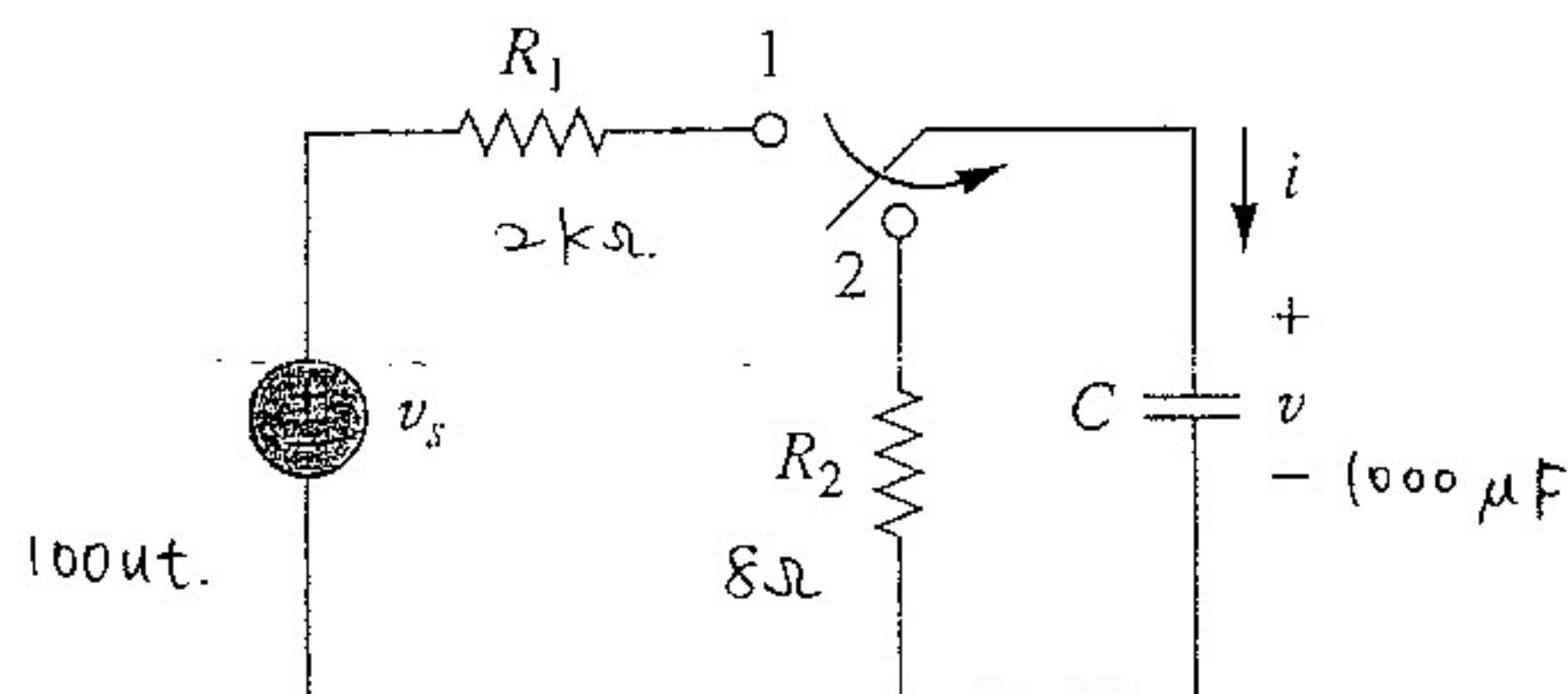
3. For the following circuit,
   （1） derive the differential equation for i, and (10%)
   （2） find its complete response for $t > 0$. (20%)
   （3） What value should the 0.5 kΩ resistor become in order to achieve critical damping condition? (10%)