Name: **SOLUTION**

1. For the circuit shown, the switch is in the open position for a long time before \( t = 0 \), when it is closed instantaneously.

   a). **Write** the values of the inductor voltage and current and the capacitor voltage and current at \( t = 0^- \). (5 points).
   
   - \( v_L(0^-) = 0 \text{V} \quad i_L(0^-) = 1 \text{A} \)
   - \( v_C(0^-) = 8 \text{V} \quad i_C(0^-) = 0 \text{A} \)
   
   \[
   i = \frac{11 \text{V}}{11 \Omega} = 1 \text{A}
   \]
   
   \[
   v_C(0^-) = 8 \text{V}
   \]

   b). **Write** the values of the inductor voltage and current and the capacitor voltage and current at \( t = 0^+ \). (10 points).
   
   - \( v_L(0^+) = 1 \text{V} \quad i_L(0^+) = 1 \text{A} \)
   - \( v_C(0^+) = 8 \text{V} \quad i_C(0^+) = 1 \text{A} \)
   
   \[
   \frac{11 - V_1}{1} = 1 + \frac{V_1 - 8}{1}
   \]
   
   \[
   \Rightarrow 2V_1 = 18 \Rightarrow V_1 = 9 \text{V}
   \]
   
   \[
   v_L(0^+) = 9 - 8 \times 1 = 1 \text{V}
   \]
   
   \[
   i_C(0^+) = \frac{9 - 8}{1} = 1 \text{A}
   \]

2. Express the following waveform in terms of unit step and ramp functions \((u(t), r(t))\). (10 points).

   \[
   r(t) = r(t-1) - 2u(t-1) + 3r(t-1) - 3r(t-2)
   - u(t-2) - r(t-2) + r(t-3)
   - 2u(t-3) + 2r(t-3) - r(t-4)
   - r(t-5)
   \]

   OR

   \[
   r(t) = 2u(t-1) + 2r(t-1) - u(t-2)
   - 4r(t-2) - 2u(t-3) + 3r(t-3)
   - r(t-4) - r(t-5)
   \]