1. For the circuit shown, switch S1 is in the open position and switch S2 is in the closed position for a long time before \( t = 0 \), when S1 is closed and S2 is opened instantaneously.

   a). Write the values of the inductor voltage and current and the capacitor voltage and current at \( t=0^- \). (5 points).
   
   \[
   v_L(0^-) = 0 \text{V} \quad i_L(0^-) = 2 \text{A} \\
   v_C(0^-) = -4 \text{V} \quad i_C(0^-) = 0 \text{A}
   \]

   b). Write the values of the inductor voltage and current and the capacitor voltage and current at \( t=0^+ \). (10 points).
   
   \[
   v_L(0^+) = 1 \text{V} \quad i_L(0^+) = 2 \text{A} \\
   v_C(0^+) = -4 \text{V} \quad i_C(0^+) = 1 \text{A}
   \]

   \[
   \frac{4-V_i}{1} - 2 - \frac{V_i}{1} = 0 \\
   2V_i = 2 \implies V_i = 1\text{V} \\
   \implies v_c(0^+) = 1 \text{A}
   \]

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

   \[
   2u(t) - 4r(t) + 7r(t-1) + u(t-2) \\
   -4r(t-2) - 3u(t-3) + 3r(t-3) \\
   -2r(t-4) + u(t-4) - u(t-5)
   \]

   \[
   \text{Ans:} \quad 2u(t) - 4r(t) + 4r(t-1) + 3r(t-1) \\
   -3r(t-2) + u(t-2) - r(t-2) + r(t-3) \\
   -3u(t-3) + 2r(t-3) - 2r(t-4) + u(t-4) \\
   - u(t-5)
   \]