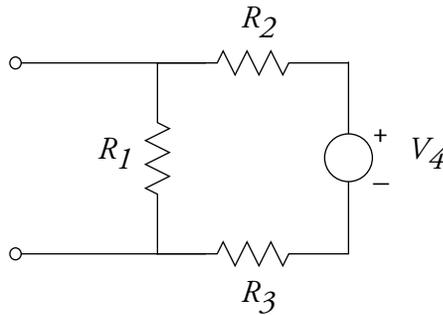**Problem S7 (Signals and Systems)**

Find the Thevinin and Norton equivalent circuits for the circuits below. Hint: Add a test current to the terminals, and then determine the voltage at the terminals as a function of the test current. You should find that the terminal voltage can be expressed as

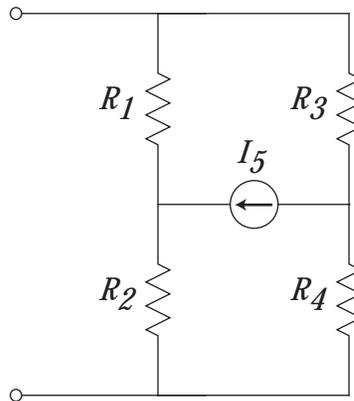$$v = V_T + R_T I_{\text{test}}$$

1.

where

$$R_1 = 3 \ \Omega, \quad R_2 = 4 \ \Omega, \quad R_3 = 2 \ \Omega, \quad V_4 = 12 \ V$$

2.

where

$$R_1 = 1 \ \Omega, \quad R_2 = 4 \ \Omega, \quad R_3 = 4 \ \Omega, \quad R_4 = 1 \ \Omega, \quad V_5 = 10 \ V$$