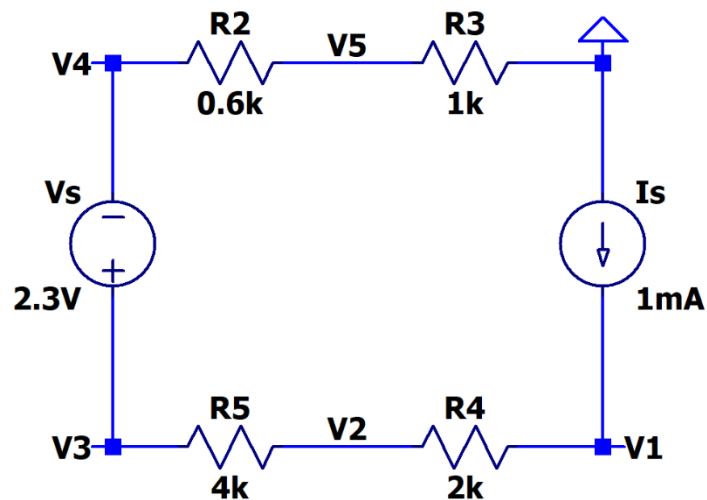


Midterm Exam – Wednesday, March 9  
EE220 – Circuits I  
Spring 2022

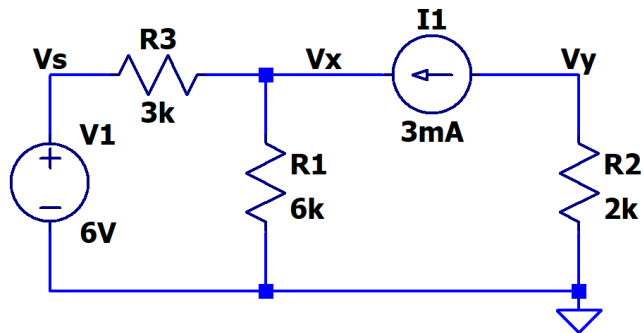
To get full credit:

- Show your work.
- Put a box around each of your answers.
- Make sure to **follow all instructions**.

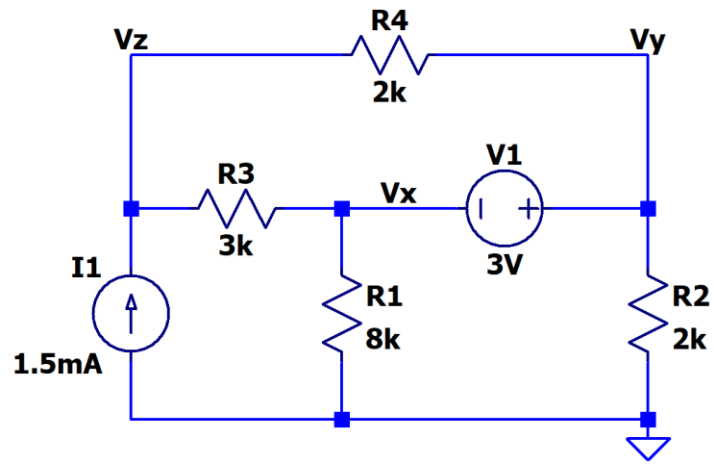
1. Determine the voltages ( $V_1$ ,  $V_2$ ,  $V_3$ ,  $V_4$ ,  $V_5$ ) labeled in the circuit below. (15 points)



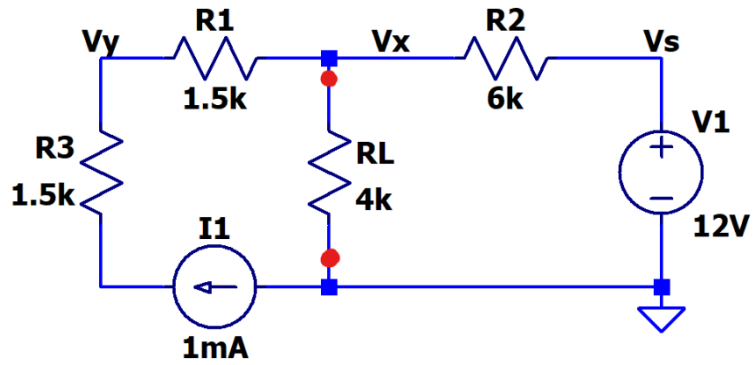
2. Determine  $V_x$  in the following circuit **using superposition**. Then, determine the current flowing through  $R_1$ . (15 points)



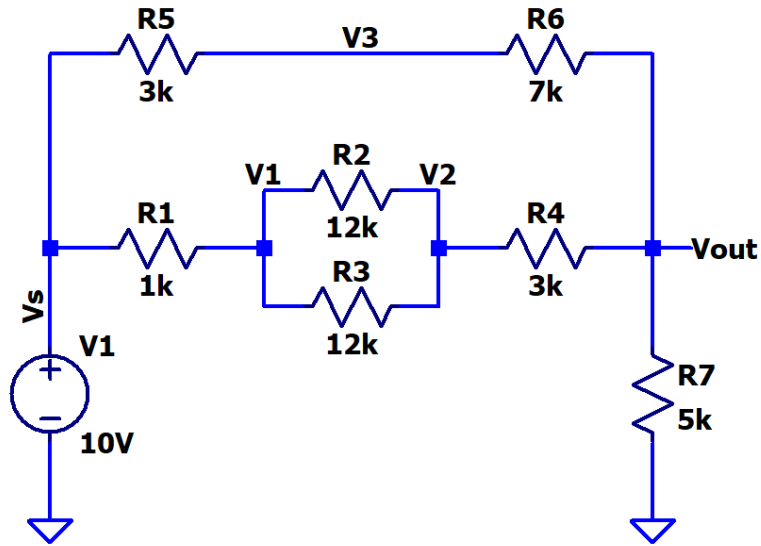
3. Determine each of the loop currents in the following circuit **using mesh analysis**. Use the loop currents you find to determine  $V_x$ ,  $V_y$ , and  $V_z$ . (20 points)



4. Determine  $V_x$  labeled in the circuit below using any method you choose. Then, find the Thevenin and Norton equivalent circuits **when the load resistor ( $R_L$ ) is removed**. Verify that your equivalent circuits are correct by connecting the load resistor across the terminals of your equivalent circuits and comparing the output voltage to your original calculation of  $V_x$ . (20 points)



5. Determine  $V_{out}$  in the circuit given below. Also, determine the current that flows through resistor  $R7$ . Note that you can reduce the resistance between  $V_s$  and  $V_{out}$  down to a single equivalent resistor. (15 points)



6. Determine each of the voltages labeled in the circuit below ( $V_s$ ,  $V_w$ ,  $V_x$ ,  $V_y$ ,  $V_z$ ). Do  $R_4$  and  $R_5$  dissipate the same amount of power? Show your power calculations to support your answer. (15 points)

