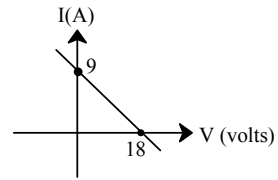
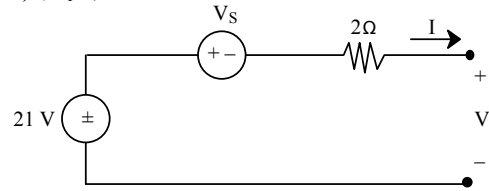


Problem 4 (20 points)

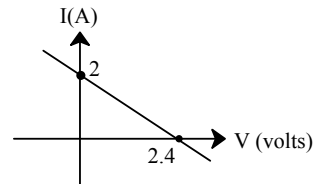
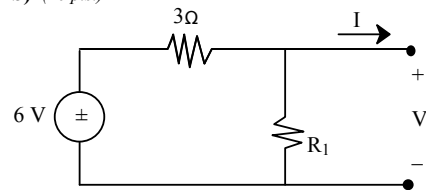
In the two parts below the IV graph is given for the circuit and you must retrieve the missing quantities. Show all of your work and reasoning.

a) (10 pts.)



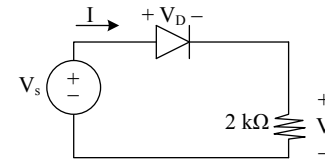
$V_s =$

b) (10 pts.)



$R_1 =$

Problem 6 (20 points)

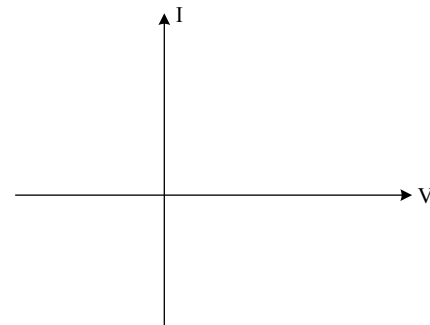


Assume the large signal model with $V_{on} = 0.5$ volts.

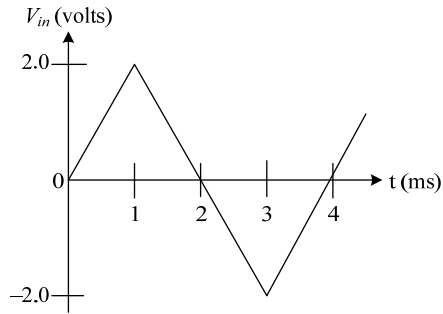
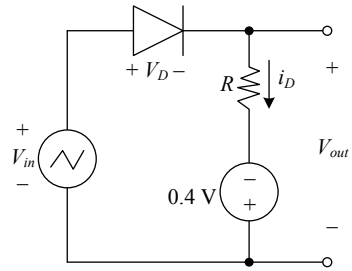
(a) [10 pts.] Solve the circuit for $V_s = 14$ volts. Show all work (be precise and clear).

$V =$ $I =$

(b) [10 pts.] Draw I versus V_s . Show all work for entire graph (be precise and clear). Label graph with all relevant values and units.



Problem 1 (20 points) The circuit below has a sawtooth wave voltage source with period 4 ms, a diode with $V_{on} = 0.6$ V, and a resistor $R = 9$ k Ω . By KVL and Ohm's Law, $V_{in} = V_D + V_{out}$, and $V_{out} = i_D R - 0.4$. To analyze this circuit, use the **large signal model**.



(a) [7 pts.] Express V_{out} in terms of V_{in} when the diode is **on**, and the range of V_{in} when the diode is on. **Show your work.**

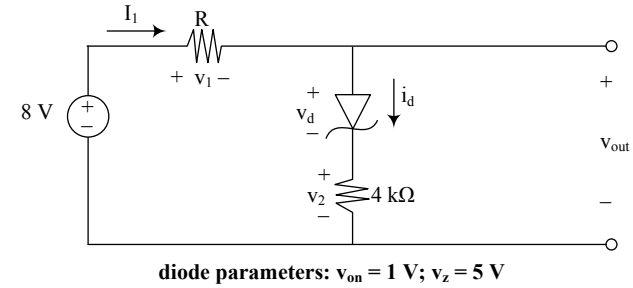
(b) [7 pts.] Express V_{out} in terms of V_{in} when the diode is **off**, and the range of V_{in} when the diode is off. **Show your work.**

$V_{out} =$ _____ $V_{out} =$ _____
 when _____ $< V_{in} <$ _____ when _____ $< V_{in} <$ _____

(c) [6 pts.] Plot the output voltage V_{out} for one period. Label the vertical axis with the voltages, and the horizontal axis with the times at which the behavior of the output changes.



Problem 1 (15 points)



When $R = 1$ k Ω give i_d , v_d , v_{out} and the region in which the diode operates. Show all work.

$i_d =$ $v_d =$ $v_{out} =$

The diode is operating in the region: