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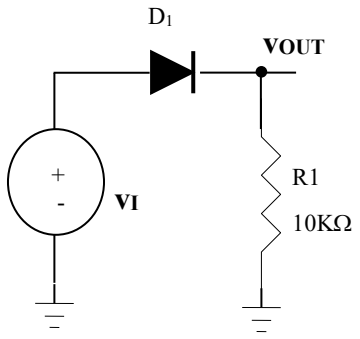
Laboratory #5: Diode Rectifiers

PRE-LAB

1. For the diode circuit shown in Figure 1, consider the diode to be ideal. The input voltage v_I given to the circuit is a sinusoid with a peak value of 10V.
For the circuit
(a) Derive the expression for the transfer characteristic v_{OUT} versus v_I for the circuit.
(b) Plot the transfer characteristic v_{OUT} versus v_I indicating the values of all significant points and the values of the slopes of all segments.
(c) Draw the corresponding output voltage v_{OUT} vs. time for two cycles of the the input v_I
(d) Find the peak diode current.
(e) Find the maximum reverse voltage seen by the diode.

Figure 1



2. If a capacitor is connected **instead of** the resistor R1 in Figure 1, draw the corresponding output voltage v_{OUT} vs. time for two cycles of the the input v_I.
3. If a capacitor is connected **in parallel with** the resistor R1 in Figure 1, draw the corresponding output voltage v_{OUT} vs. time for two cycles of the the input v_I.