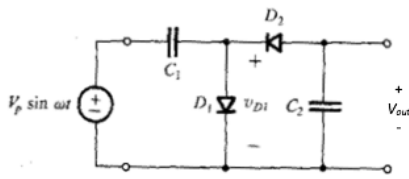


Problem 1

Consider the voltage doubler circuit in Figure 1. Perform the following:



- A sinusoidal input voltage is applied at $t=0$. Plot the output waveform of the circuit for the first three periods $T=1/f$ provided that the initial condition across C_1 and C_2 is zero.
- Use LTspice to plot the transient behavior of the voltages V_{in} , V_{out} , and V_{D1} . Provided that $V_p = 10\text{ V}$, $f = 2\text{ KHz}$, $C_1 = C_2 = 1\text{ }\mu\text{F}$, and the diode used is of type 1N4148.

Problem 2

Design a dc power supply that operates from a 120 V (rms) 60 Hz household supply through a 10 to 1 step-down transformer having a single secondary winding. The dc supply feeds a resistive load that could be within a 200-1000 Ω range and requires a nominal voltage of 5 V. You can assume that a 5.1 V Zener diode is available where $r_z = 10\text{ }\Omega$ at $I_z = 20\text{ mA}$ and $I_{zmin} = 5\text{ mA}$. Perform complete simulations plotting the waveforms at various stages. Determine the line and load regulation of your design.