Physics 536 - Assignment #4

1. In the following, treat the diodes as idealized devices that allow current to flow in one direction only, ignoring any voltage drop across them.

(a) Consider a transformer being driven by an AC voltage source with RMS amplitude $V_0$. Calculate the peak amplitude of this voltage source and sketch its waveform.

(b) If the transformer in the circuit shown below has a turns ratio of $n = N_2/N_1$, sketch the waveform of the voltage across the load $R_L$, comparing it with the waveform in (a). Calculate the RMS voltage, $V_L$, across the load.

(c) The diodes in the circuit shown below are in a configuration referred to as a bridge rectifier. Sketch the waveform of the voltage across the load, $R_L$, and calculate the RMS voltage of this waveform.

(d) Suppose the transformer has a center tap that is held at ground potential and is connected in the configuration shown below. Sketch the waveform for the voltage across $R_L$ in this configuration and calculate RMS voltage.