Midterm Exam – EE 442 and ECG 642 Power Electronics
Fall 2022 – University of Nevada, Las Vegas

NAME:_____

Closed book and notes.
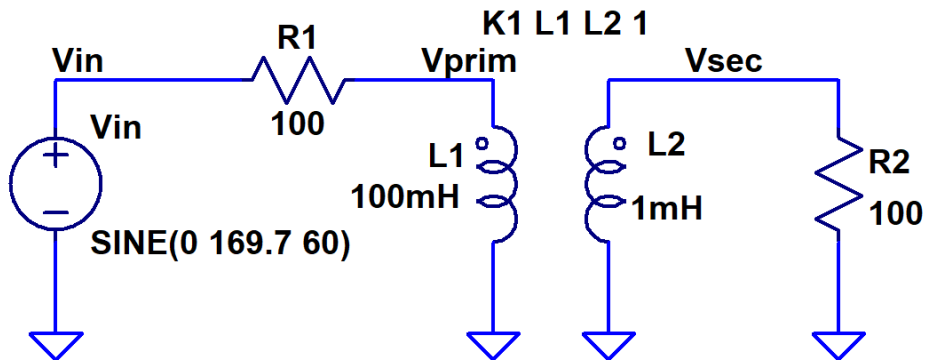**Show your work for credit and put a box around your answers.**

1. Sketch a full-wave rectifier using four diodes, a transformer, and a filter capacitor. (5 points)

2. Explain, in your own words, reverse recovery time of a diode. (5 points)

3. What happens to the depletion region width of a diode as it's forward biased? In this case is the diode depletion capacitance, generally, a concern? Why or why not? (5 points)
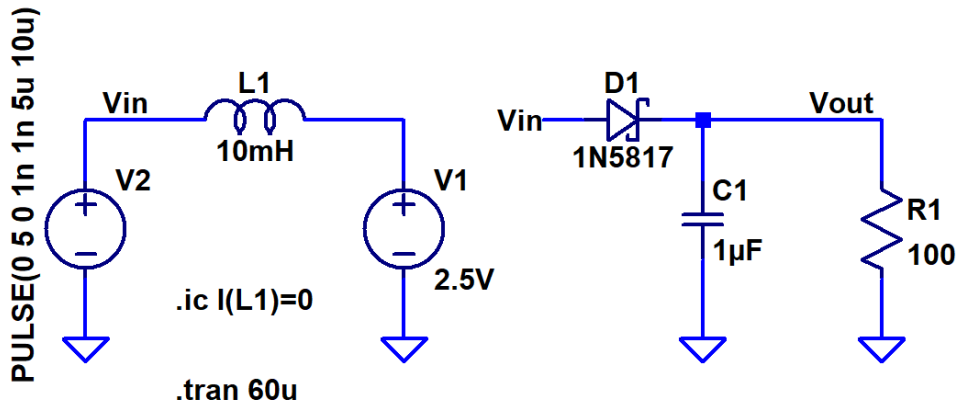
4. What is the magnetizing inductance in a transformer? Is the magnetizing inductance still a concern if a load is connected to the secondary of a transformer? Why? (5 points)

5. What would happen to the current flowing on the hot (aka phase or line) voltage in your home if you shorted the neutral to the ground in an electrical water heater? Where is the ground connected in the water heater? Why? (5 points)

6. Determine, and plot along Vin, the voltages Vprim and Vsec (sinusoidal time domain equations that show phase shift) flowing in the following circuit. (25 points)

7. Determine the currents flowing in L1 and R1 in the following circuits. (25 points)

PULSE(0 5 0 1n 1n 5u 10u)

Vin

L1
00000
10mH

V2

.ic I(L1)=0

.tran 60u

V1

2.5V

D1

Vin

1N5817

C1

1µF

Vout

R1

100

8. For the following circuit, determine the current in the inductor, the average output voltage, and the ripple in the output voltage. As always, show your hand calculations for credit. (25 points)