

**University of New Mexico**  
Department of Electrical and Computer Engineering

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**ECE 321L – Electronics I (Fall 2023)**

**Homework #4**

*Due in class: Wednesday September 20, 2023*

1. A full wave rectifier using a diode bridge and a 120V/12V transformer is designed to deliver power to a  $10\Omega$  load. Assume all diodes have  $V_{on}=0.7V$  and negligible off current.
  - a. What is the ripple voltage, if the capacitance of the filter is  $2500\mu F$ ?
  - b. Considering the ripple calculated in part a, what is the average DC voltage of the output (hint: it will be approximately the peak (max) voltage minus  $V_r/2$ )?
  - c. Considering the average DC voltage of the output found in part b, determine the average current and power in the load resistor.
  
2. Design a full wave rectifier for a regulator that delivers 100W electrical power to a white off-the-shelf LED (<http://www.wayjun.com/Datasheet/Led/100W%20White%20LED.pdf>). Per datasheet, the LED requires 33V and draws 3A current. You are required to limit the ripple voltage to less than 20% of average DC voltage of the output. Assume all diodes have  $V_{on}=0.7V$  and negligible off current.
  - a. Draw the circuit diagram.
  - b. Determine the voltage of transformer and capacitance of the filter.