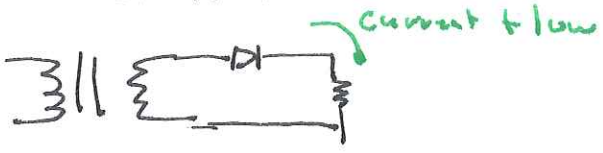
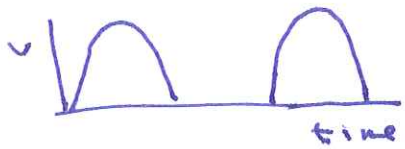
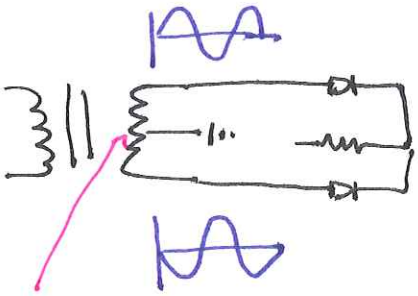
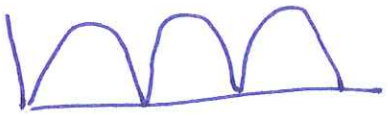
Rectification





"half wave"

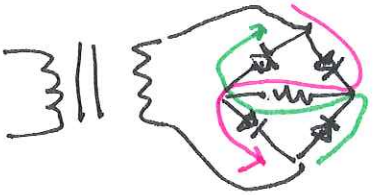




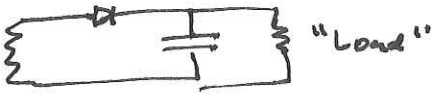
"full wave"

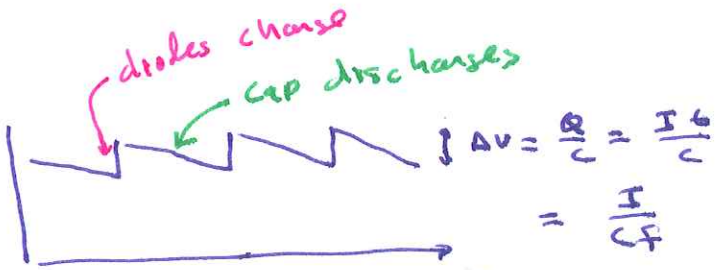
f = 120 Hz

"center tapped"



full wave bridge with 2 diode drops

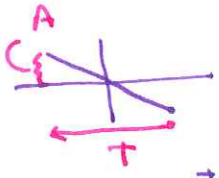




R_{TH}?

$$V_{DC} = V_0 - \frac{1}{2}\frac{IT}{C}$$

what is V_{rms} of sawtooth?



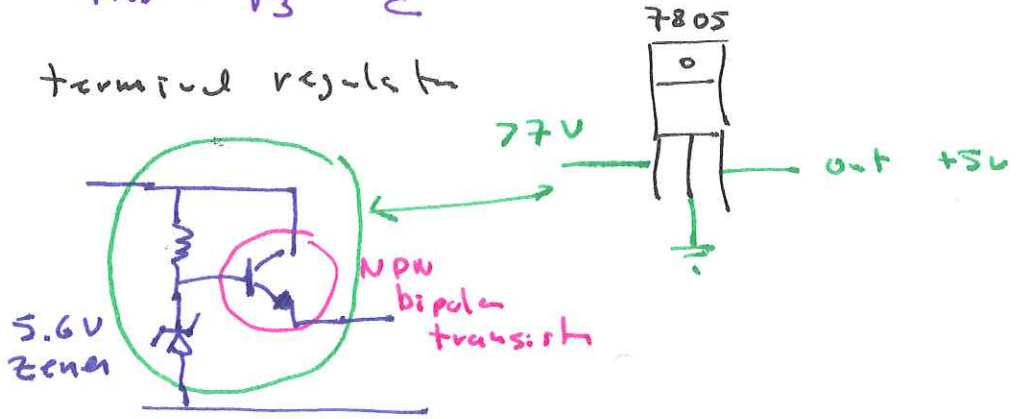
$V = -A\,t/(T/2)$

$$\langle V^2 \rangle = \frac{1}{T}\int_{-T/2}^{T/2} \left(-A\,t/(T/2)\right)^2 dt = \frac{4A^2}{T^3} 2\int_0^{T/2} t^2\,dt$$

$$= \frac{A^2}{3} \rightarrow V_{rms} = \frac{A}{\sqrt{3}}$$

$$V_{rms} = \frac{1}{\sqrt{3}}\frac{I\,T/2}{C}$$

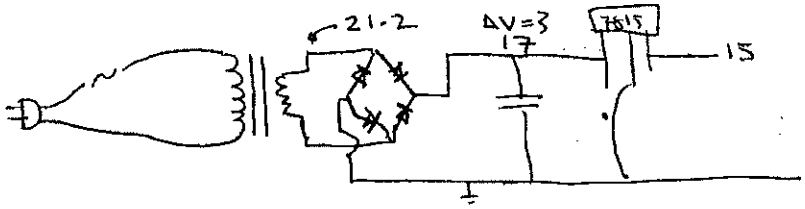
3 terminal regulator



Select six (6) (out of seven) problems for grading.

1. Design and provide the schematic diagram for a +15 volt regulated power supply that will supply .75 A of current. Use a 7815 IC regulator, which is similar to the 7805 used in lab (e.g., it requires a 2 V "headroom"), but is designed for 15 volts. The full-current peak-to-peak ripple before the regulator should be 3 V. Record on your drawing the ratings for all components (e.g., transformer rms secondary voltage, C of capacitor, power dissipated in regulator at full current, rating for fuse on 120 V line cord, etc.)

1)



$V_{rms} = \frac{21.2}{\sqrt{2}} = 15.0\,V$ $\quad C = \frac{IT}{\Delta V} = \frac{(.75)\left(\frac{1}{120}\right)}{3} = 2080\,\mu F$

7815 pwr = $(2+1.5)(.75) = 2.63\,W$ $\quad$ fuse = $\frac{(21.2)(.75)}{120}$

$= .133\,A$ use $\frac{1}{4}\,A$