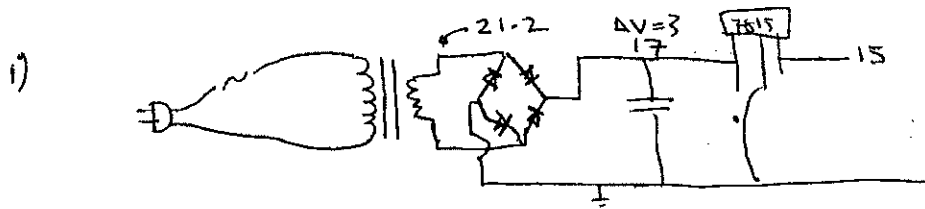


Select six (6) (out of seven) problems for grading.

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.)



$$V_{\text{rms}} = \frac{21:2}{\sqrt{2}} = 15.0 \text{ V}$$

$$C = \frac{IT}{\Delta V} = \frac{(.75)(\frac{1}{120})}{3} = 2080 \mu\text{F}$$

$$7815 \text{ power} = (2 + 1.5)(.75) = 2.63 \text{ W}$$

$$\text{fuse} = \frac{(21:2)(.75)}{120} = .133 \text{ A use } \frac{1}{4} \text{ A}$$

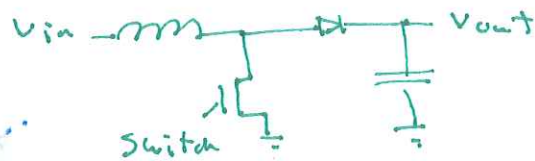
switching Power Supplies → use "conservative" behavior of switched inductor to control output voltage

→ High Efficiency; high freq "noise"

while not as simple as 7805 there are chips to make switches

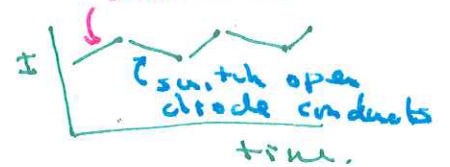
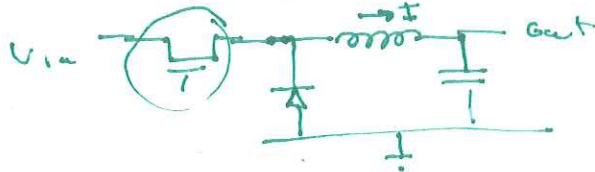
→ single block DC → DC [even DC+ → DC-] converters

Boost (buck + switch)



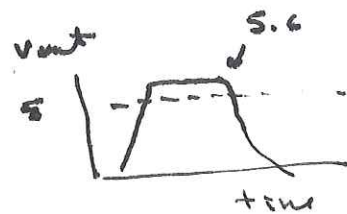
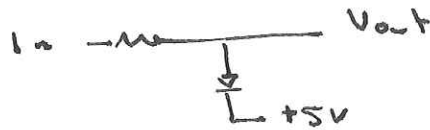
get a current going to GND then switch it to Vout

Buck

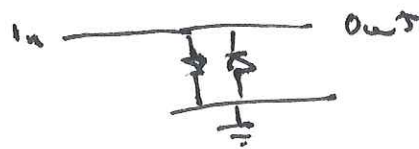


Other diode circuits

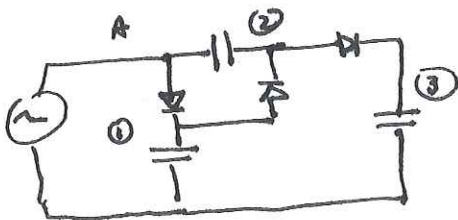
Clamp



small signal limit ± 0.6V

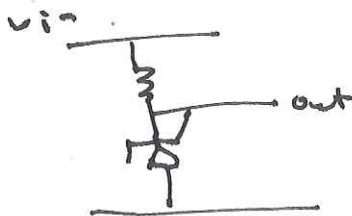


Voltage Multiplier (Cockcroft-Walton)

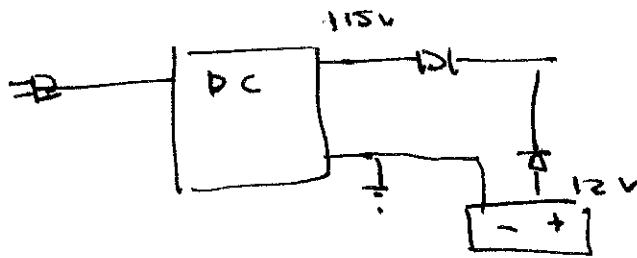


- ① changes to  $V_0$
- ② when A at  $-V_0$  changes to  $+V_0$
- ③ when A at  $+V_0$  changes to  $+3V_0$

Zener



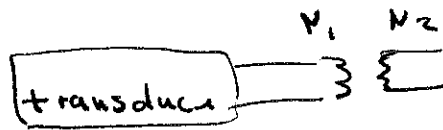
Gate



inductor



Transformers -



- power

- impedance match  
 ↳ after inductor =  $\left(\frac{N_2}{N_1}\right)^2 R_T$

- Free up ground

- insert a signal at a "floating" potential