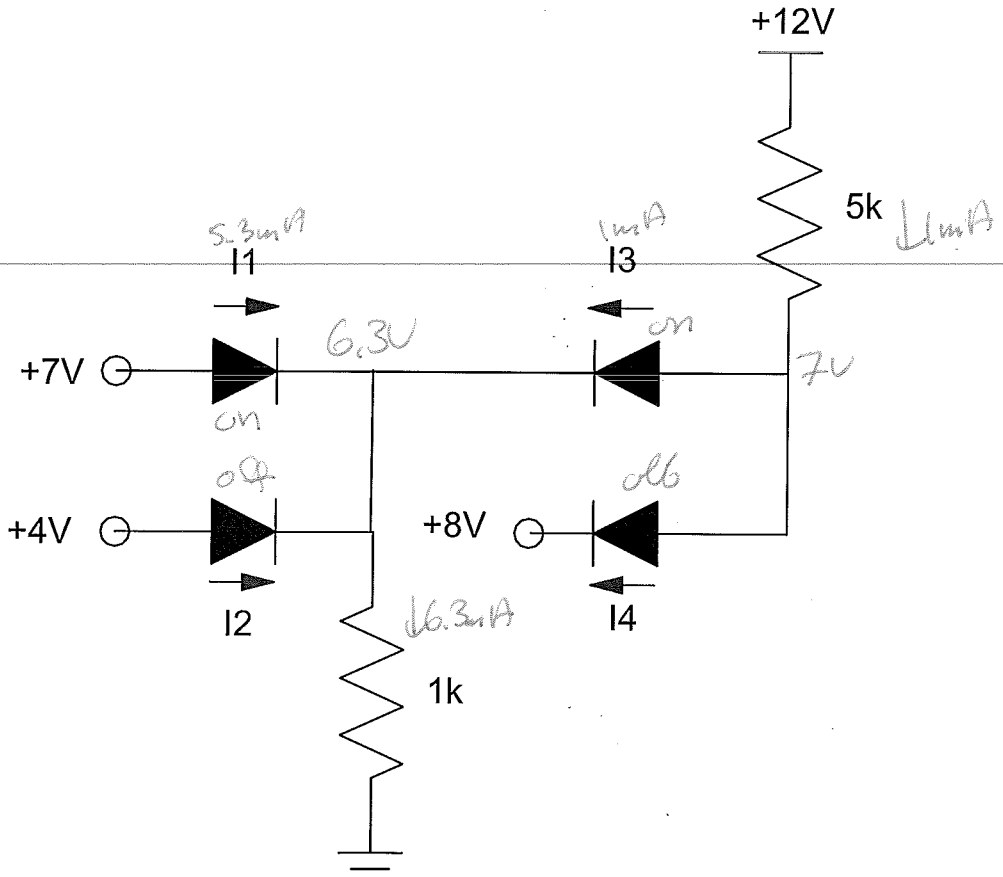
ECE 320: Quiz #4 Name _____

Max/Min, AC to DC, DC to DC - February 18, 2016

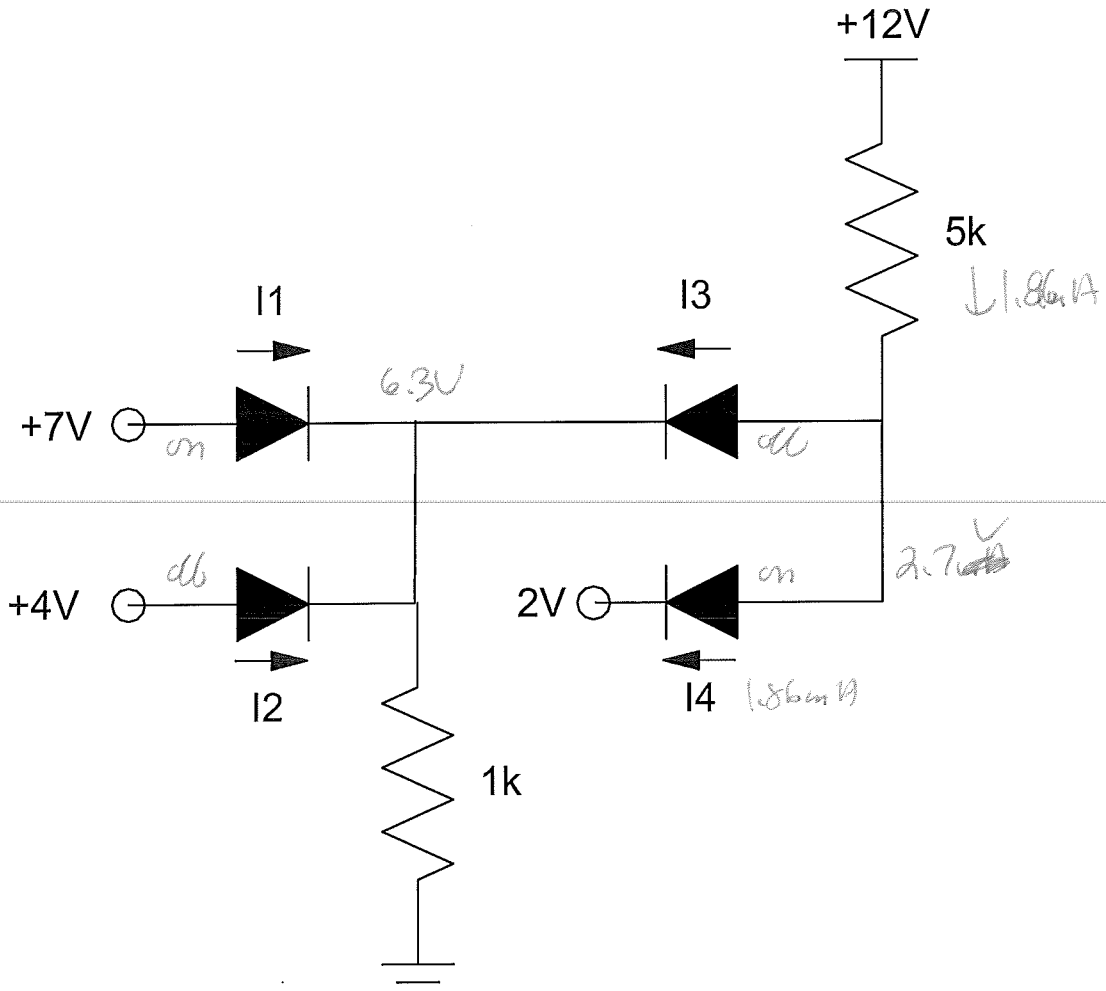
1) Assume ideal silicon diodes (Vf = 0.7V). Determine the currents I1, I2, I3, and I4

I1	I2	I3	I4
5.3mA	0	1mA	0



2) Assume ideal silicon diodes (Vf = 0.7V). Determine the currents I1, I2, I3, and I4

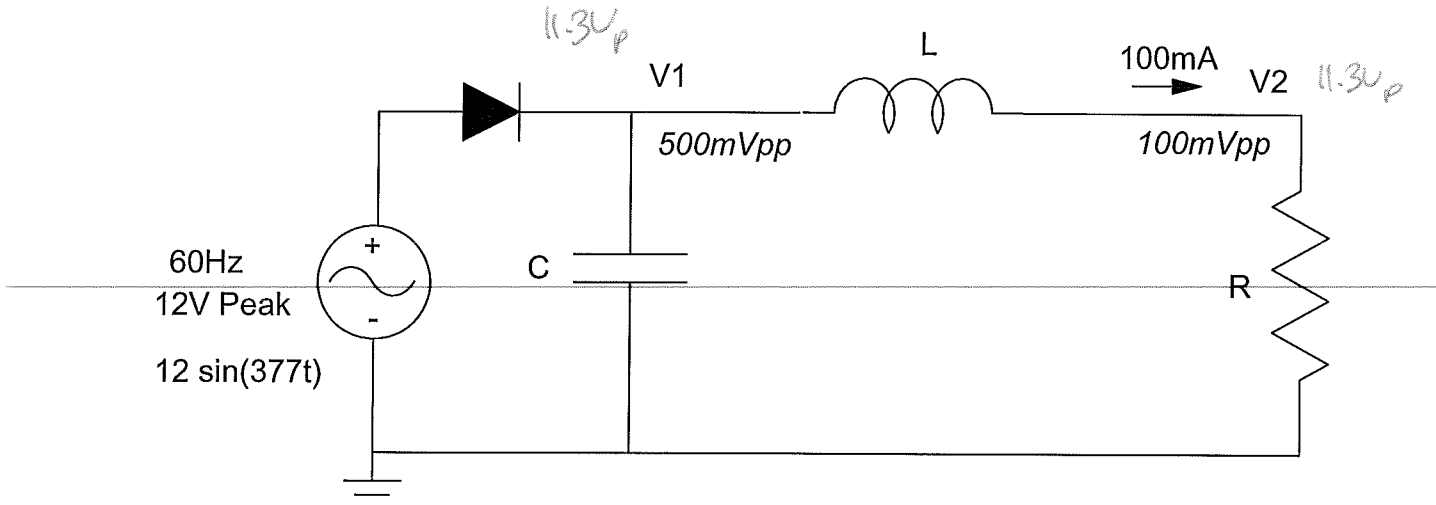
I1	I2	I3	I4
6.3mA	0	0	1.86mA



3) 1/2 wave AC to DC Converters.

- Find R so that the current to the load is 100mA
- Find C so that the ripple at V1 is 500mVpp
- Find L so that the ripple at V2 is 100mVpp

R	C	L
113Ω	3333μF	1.468H



$I = C\frac{dv}{dt}$

$.1 = C\frac{.5}{1/60}$

$C = 3333$

$\left(\frac{113}{113+j\omega L}\right)(.5) = .1$

$113 + j\omega L = 565$

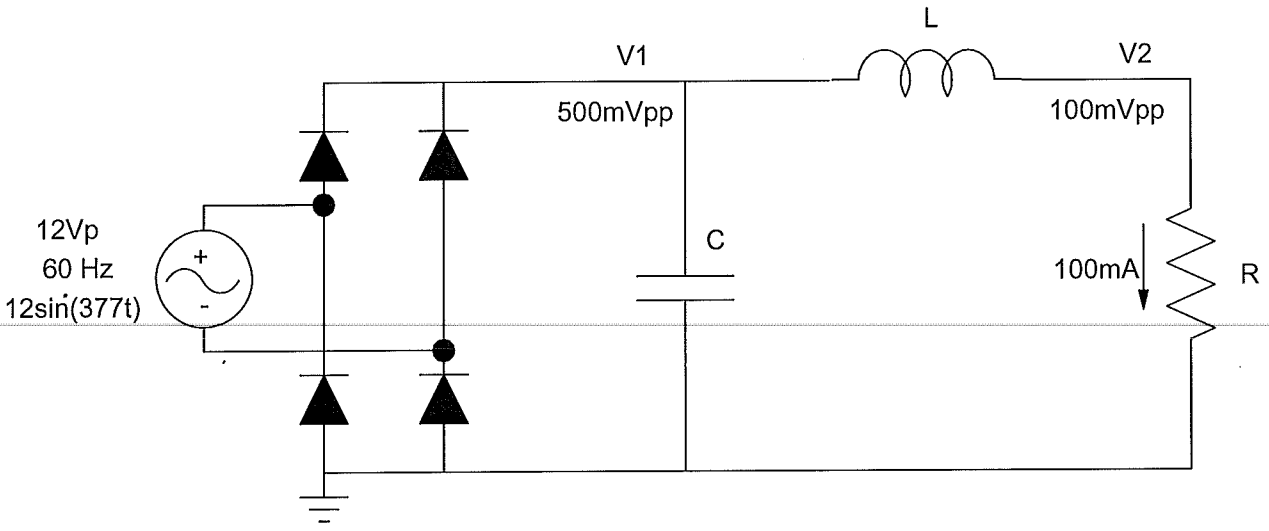
$\omega L = 553$

$L = 1.468H$

4) Full Wave AC to DC Converters.

- Find R so that the current to the load is 100mA
- Find C so that the ripple at V1 is 500mVpp
- Find L so that the ripple at V2 is 100mVpp

R	C	L
106Ω	1667μF	688mH



$12 - 1.4 = 10.6V$ $\quad \frac{10.6V}{.1A} = 106\Omega$

$I = C\frac{dv}{dt}$

$.1 = C\frac{.5}{1/120}$

$C = 1667\mu F$

$\left(\frac{106}{106 + j\omega L}\right).5 = .1$

$106 + j\omega L = 530$

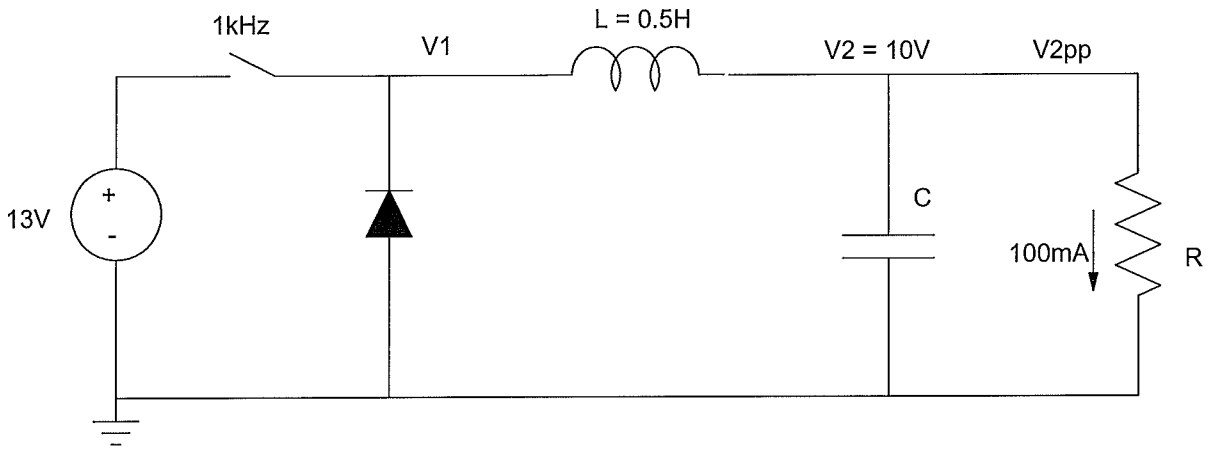
$\omega L = 519$

$L = 688mH$

$\omega = 2.377$

5) A Buck converter is used to reduce 13VDC to 10VDC. Determine the following

Ripple at V1: V1pp	R for a load of 100mA	Ripple at V2 if C = 0 V2pp	Value of C which makes V2pp = 100mVpp
13.7Vpp	100Ω	435mVpp	6.92μF



$\left(\frac{100}{100+j\omega L}\right)(13.7_{pp}) = .4359$

$\omega = 6283$

$\frac{1}{j\omega C} \simeq \frac{100}{435} = 22.95\Omega$

$C = 6.92\mu F$

Bonus: Bernie Sanders Trivia!!! Does income inequality exist?

Take the poorest 50% of the people in the U.S. (150 million) and add up their wealth. How many of the richest people in the U.S. does it take for their net worth to be the same as the poorest 50% (hint: it's less than 50%).