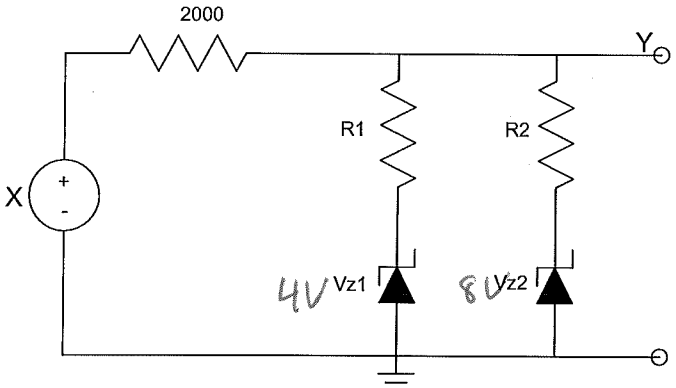
ECE 320 - Quiz #4 - Name _____

Clipper - Max/Min - AC to DC Convertyers. September 24, 2015

1) Find V1, R1, V2, and R2 so that the following circuit has approximately the following I/O relationship:

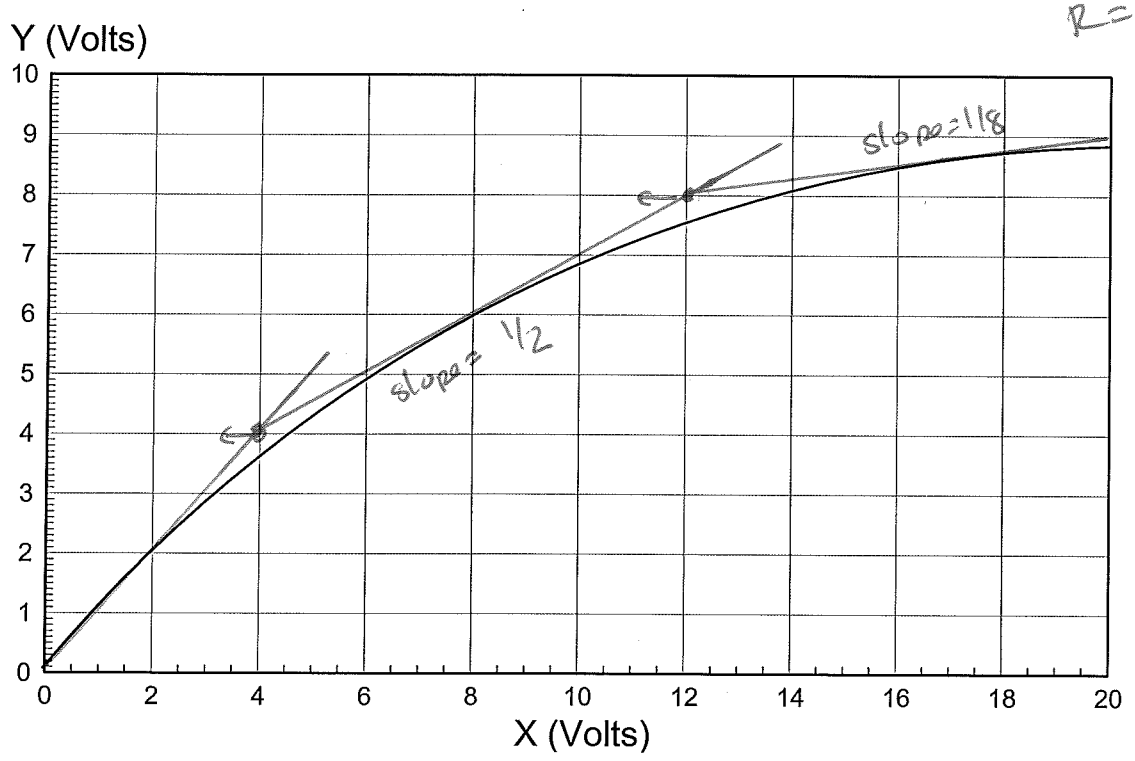
R1	Vz1	R2	Vz2
2000	4V	398	8V



$\frac{R}{R+2000} = 1/8$

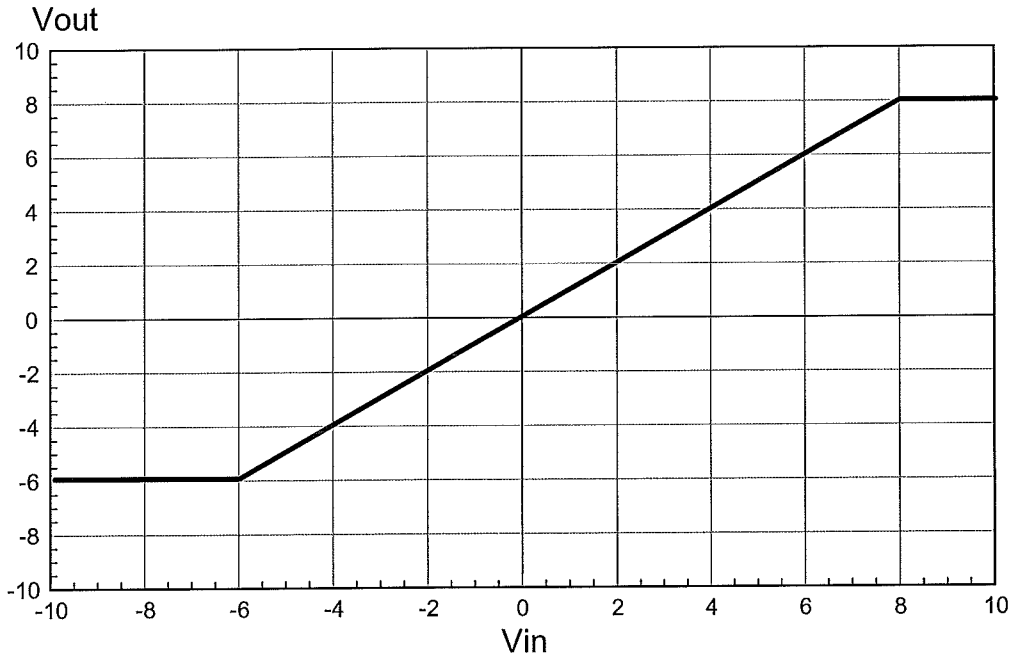
$R = 285$

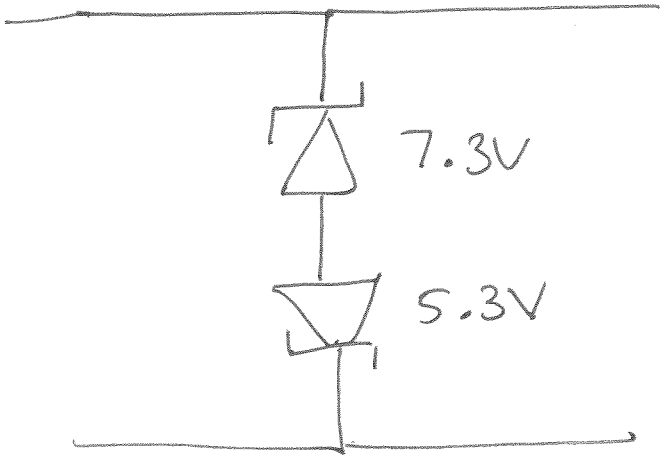
$= 1000 \parallel R_2$



2) Design a clipper circuit so that the output is

$$V_{out} = \begin{cases} +8V & V_{in} > 8V \\ V_{in} & -6V < V_{in<+8V} \\ -6V & V_{in} < -6V \end{cases}$$

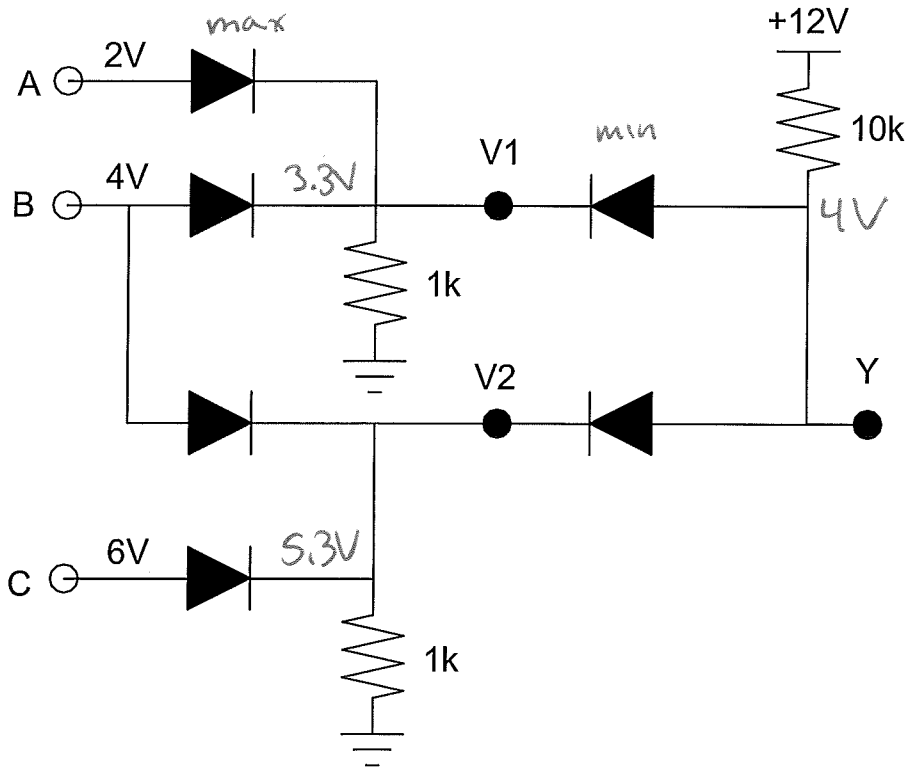




3) Determine the voltages for the following max/min circuit. Also determine the function is implementing

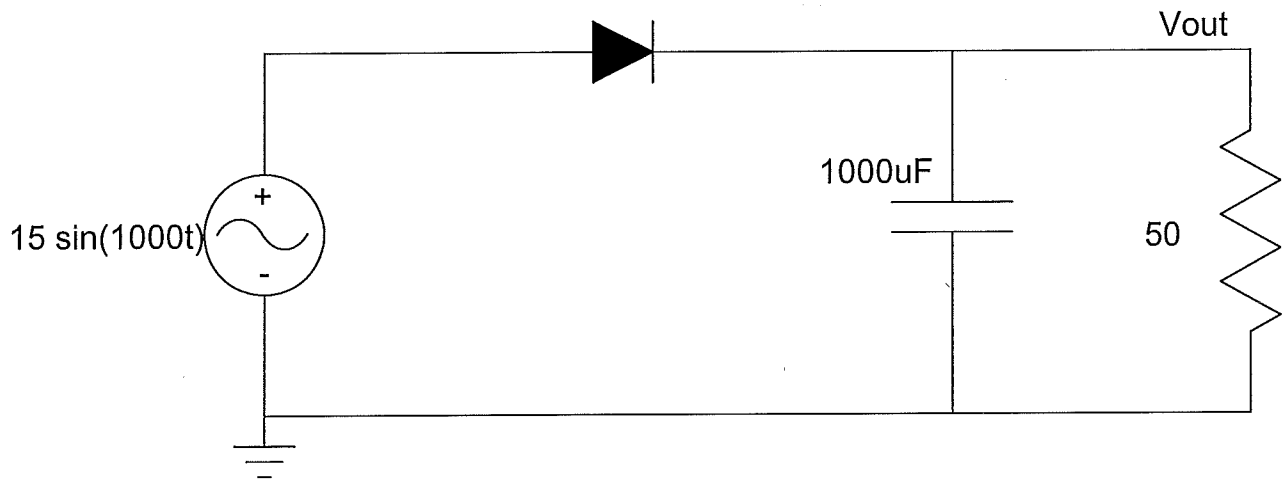
V1	V2	Y	funciton: y=f(A,B,C)
3.3V	5.3V	4V	y= min(max(A,B), max(B,C))

y = (A+B)(B+C)



4) Determine the maximum of Vout and the peak-to-peak ripple at Vout

max(Vout)	ripple at Vout (peak-to-peak)
14.3V	$1.797V_{pp}$



$f = 159Hz$

$I = C \frac{dV}{dt}$ $dt = 6.3ms$

$I = \frac{14.3}{50} = 286mA$

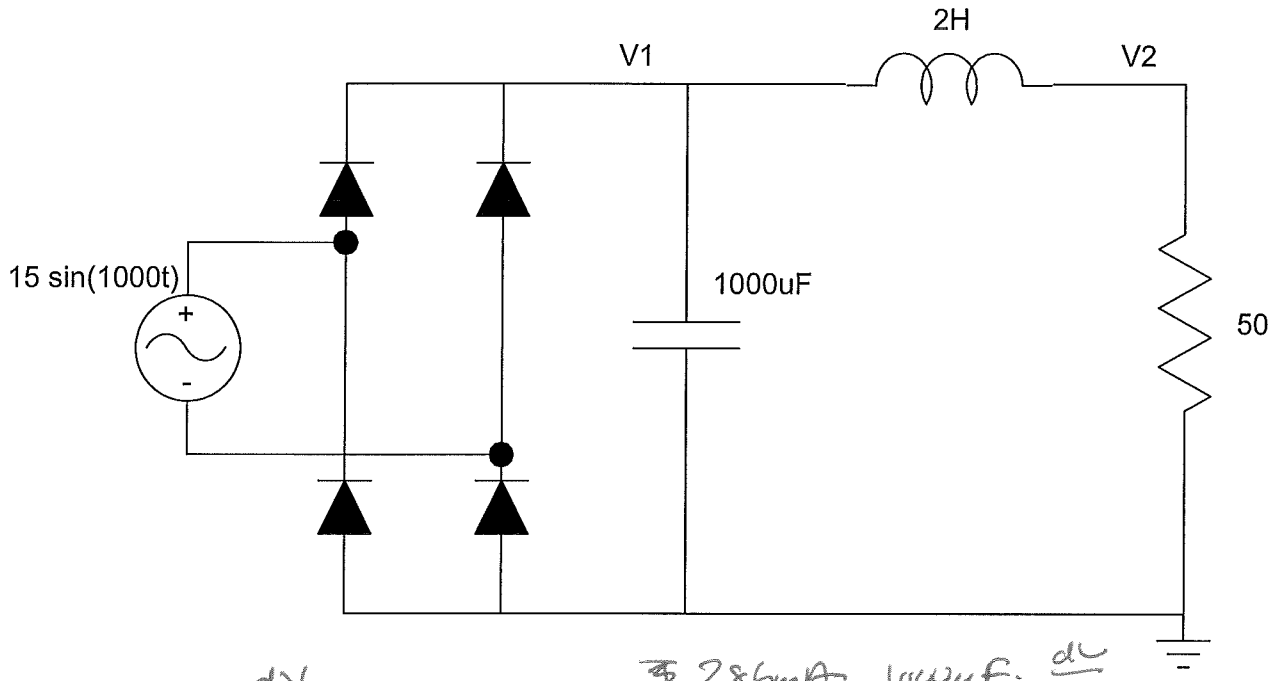
$286mA = 1000\mu F \cdot \frac{dv}{6.3ms}$

$dv = 1.797V$

5) Determine the voltages at V1 and V2

max(V1)	ripple at V1 (peak-to-peak)	ripple at V2 (peak-to-peak)
13.6V	$.8985V_{pp}$	$.0112V_{pp}$

$15-0.7*2$



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

$I = \frac{14.3V}{50\Omega} = 286mA$

$f\ dt = \frac{1000 \cdot 2}{2\pi} = 318Hz$

$dt = 1/f = 3.1ms$

$286mA = 1000\mu F \cdot \frac{dV}{3.1ms}$

$dV = .8985V_{pp}$

$V_2 = \left(\frac{50}{50 + j\omega L}\right) V_1$

$= \left(\frac{50}{50 + j4000}\right) .8985$

Colbert Bonus! In 2008, an online vote was taken to name a bridge. Just for fun, Steven Colbert asked his viewers to go online and vote "Colbert". In spite of winning fairly, the bridge was named something else. What was this bridge?

- a) The Megyeri Bridge in Budapest, Hungary
- b) The Ambassador Bridge between Detroit and Windsor, Canada
- c) The Isle of Palms bridge in South Carolina
- d) The Wandsworth Bridge in West London, England
- e) 14th Street Bridge, Washington DC