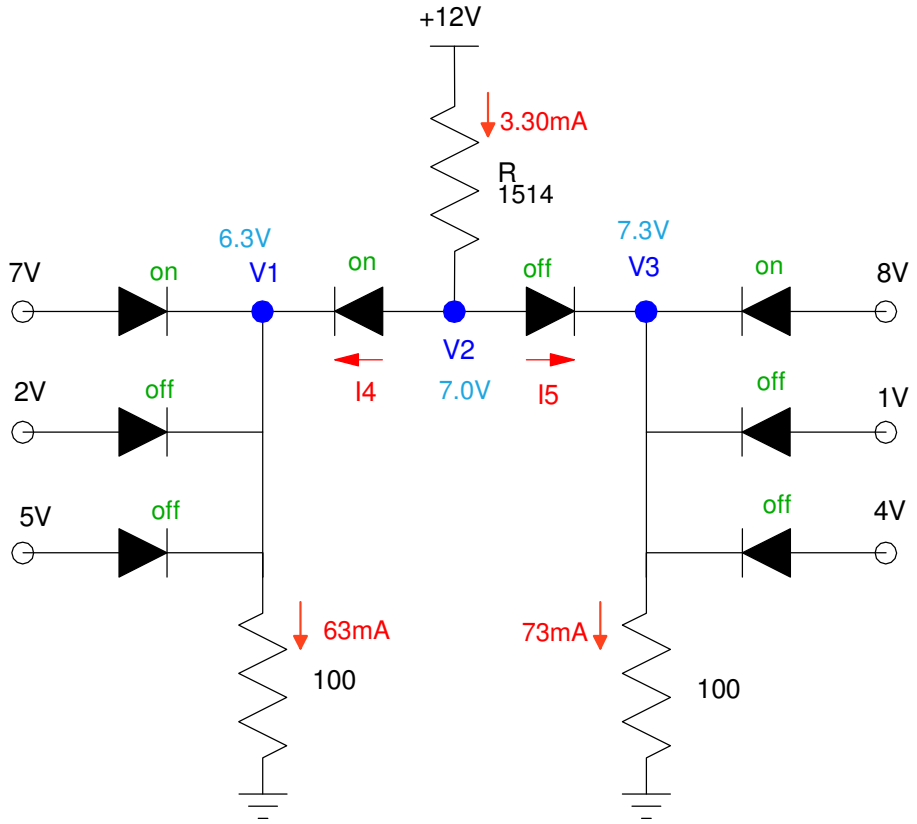
ECE 320 - Quiz #4 - Name _____

Max/Min, Clipper, Transistors. Fall 2021

1) Max/Min: Determine the voltages and currnets for the following min/max circuit.

- Assume ideal silicon diodes (Vf = 0.7V)
- R = 1000 + 100 * Birth Month + Birth Day. May 14th for example gives R = 1514 Ohms

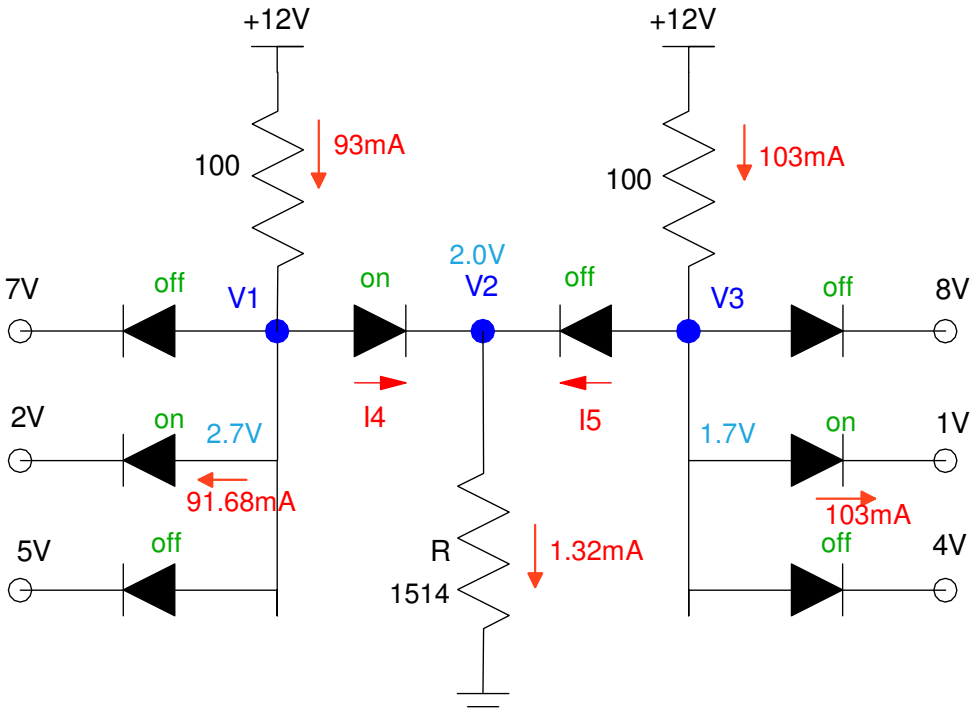
R 1000 + 100*Mo + Day	V1	V2	V3	I4	I5
1514	**6.30V**	**7.00V**	**7.30V**	**3.30mA**	**0**



2) Max/Min: Determine the voltages and currnets for the following min/max circuit.

- Assume ideal silicon diodes (Vf = 0.7V)
- R = 1000 + 100 * Birth Month + Birth Day. May 14th for example gives R = 1514 Ohms

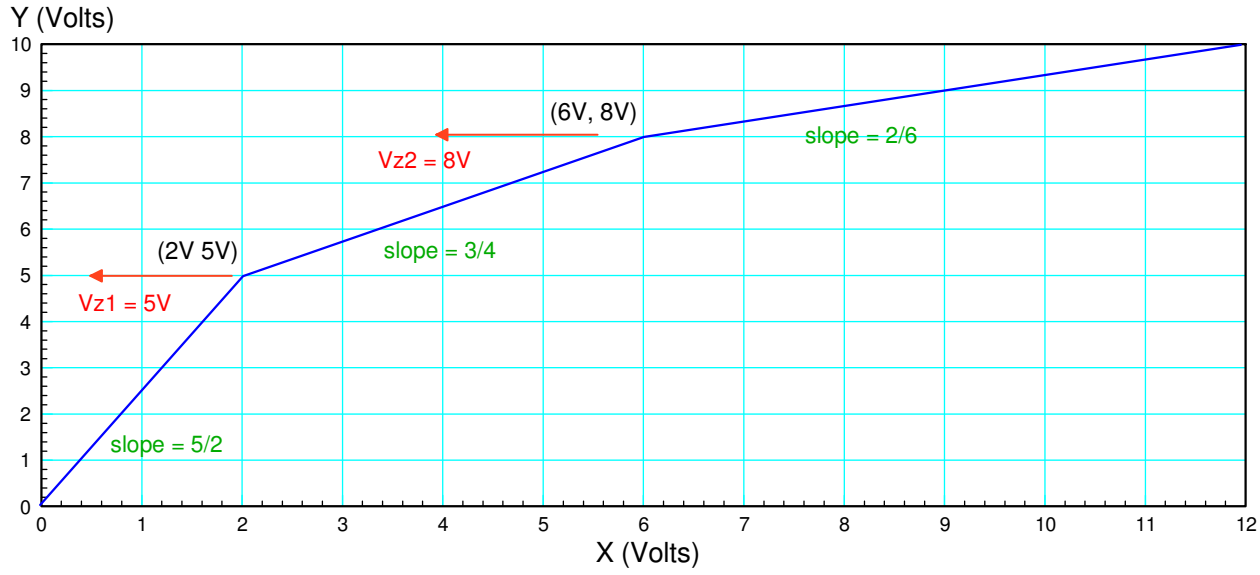
R 1000 + 100*Mo + Day	V1	V2	V3	I4	I5
1514	**2.7V**	**2.0V**	**1.7V**	**1.32mA**	**0**

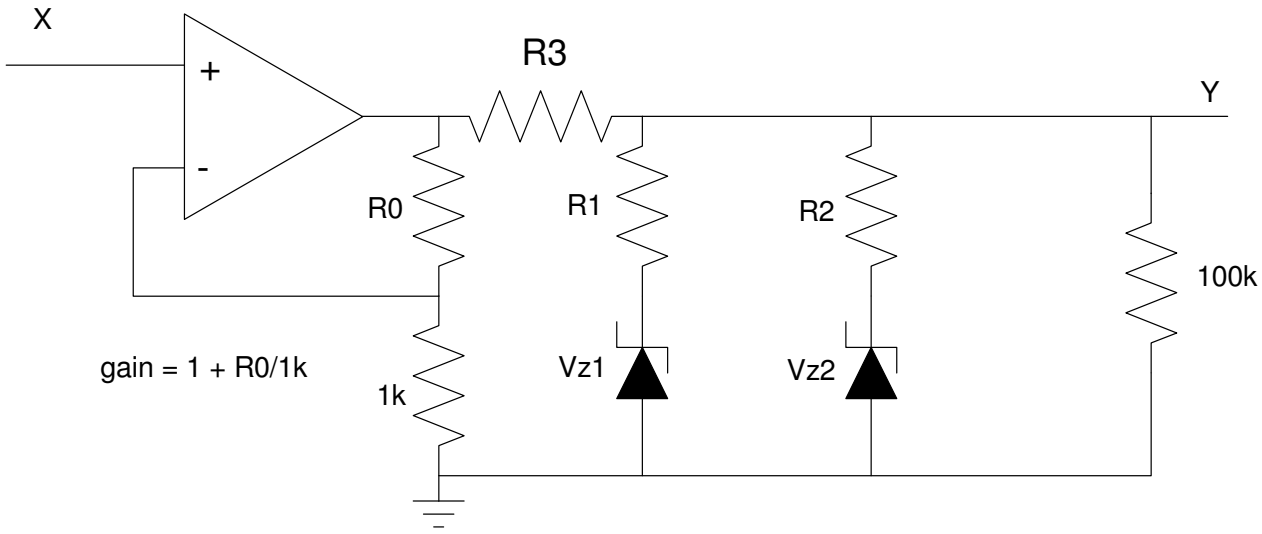


3) Clipper: Determine {R0, R1, R2, Vz1, Vz2} to implement the following function.

- Let R3 be 1000 + 100 * your birth month + your birth day. May 14th would give R = 1514 Ohms.

R3 1000 + 100*Mo + Day	R0	Vz1	R1	Vz2	R2
1514	**1500**	**5V**	**648.8**	**8V**	**363.4**



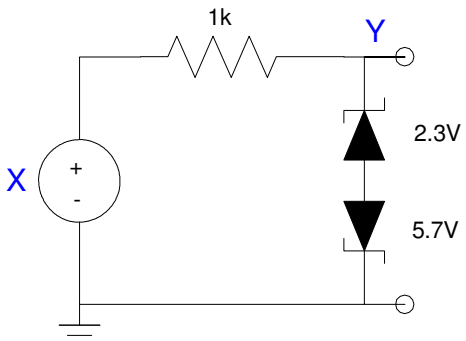


$$\left(\frac{R_1}{R_1+1514}\right)\left(\frac{5}{2}\right)=\frac{3}{4} \quad R_1 = 648.8\Omega$$

$$\left(\frac{R_{12}}{R_{12}+1514}\right)\left(\frac{5}{2}\right)=\frac{2}{6} \quad R_{12} = 232.9\Omega \qquad R_2 = 363.4\Omega$$

4) Clipper: Design a circuit to clip the voltage at +7V and -3V

$$y = \begin{cases} +3V & x > 3 \\ x & -6 < x < 3 \\ -6V & x < -6 \end{cases}$$



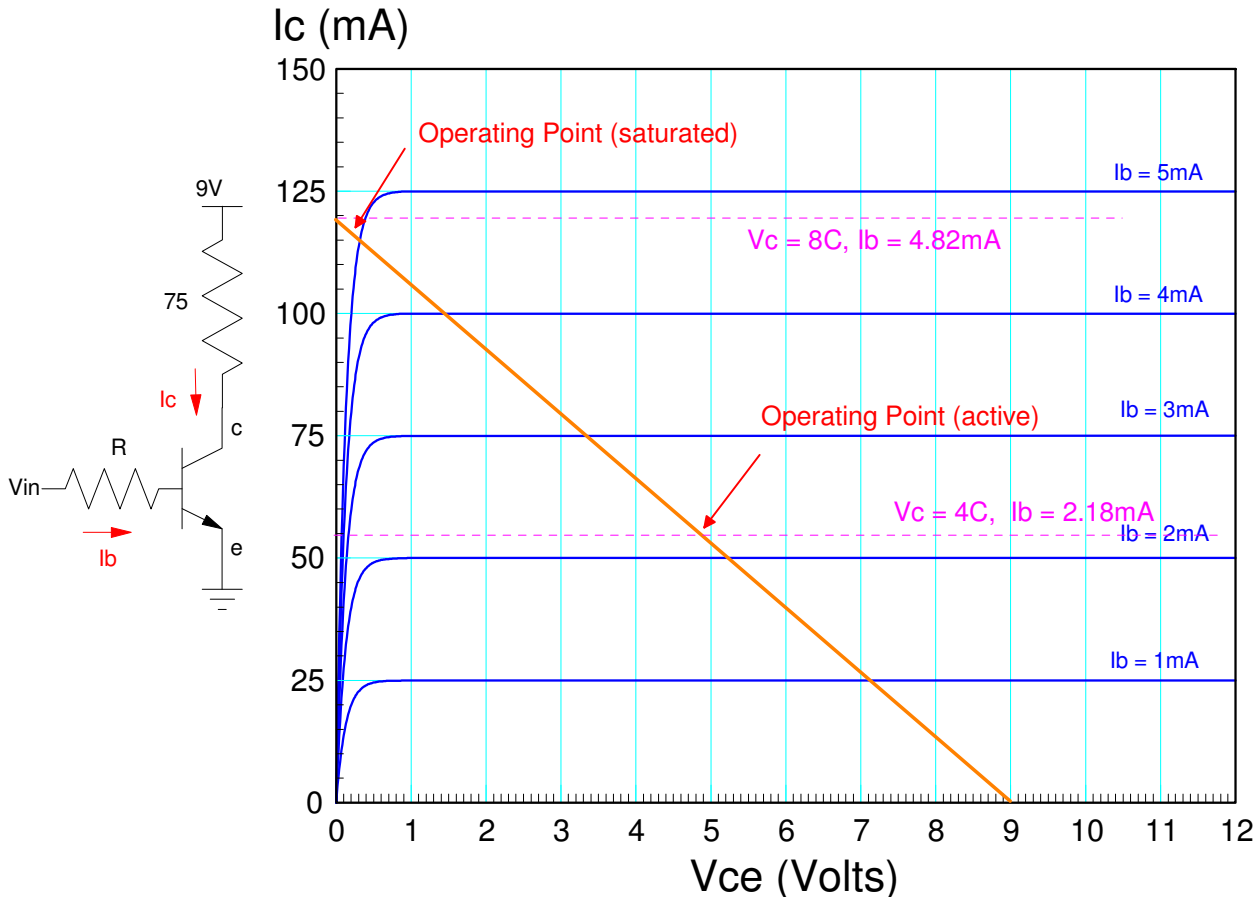
5) The VI characteristics for an NPN transistor are shown below

- Draw the load line for the following circuit
- Show on the load line the operating point (Vce, Ic) when Vin = 4V & 8V.

Assume

- Vbe = 0.7V
- Vce = 0.2V when saturated

R 1000 + 100*Mo + Day	Load Line	Vin = 4.0V	Vin = 8.0V
1514	x and y intercept or show on graph	Vce and Ic or show on graph	Vce and Ic or show on graph



6) The voltages for the following circuit are measured (shown below). From these measurements, determine the following:

R 1000 + 100*Mo + Day	Ib (mA)	Ic (mA)	Current Gain (beta)	Operating Region off / active / saturated
1514	**2.8303mA**	**46.40mA**	**16.39**	**active**