Name:_____

Student ID #:_____

EECS 170A

Homework #5

HW will be collected in discussion section.
Please do not turn your HW in **anywhere else.**
Due: 10:50am Thursday, November 3, 2011.

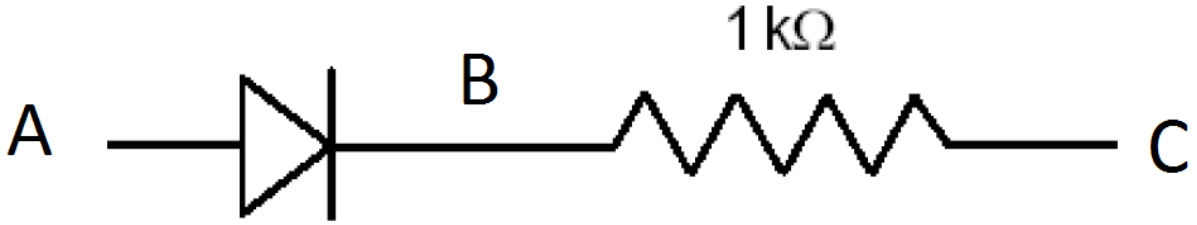
Please *staple* this sheet to the front of your homework.

1	2	3	4	Total
/25	/25	/25	/25	/100

1) The following is the Ideal Diode equation:

$$I = I_o(e^{qV_{diode}/kT} - 1)$$

Take $I_o = 10^{-15}$ A. For the circuit shown in the figure below, fill in the following table:



V_{AC} (V)	V_{Diode} (V)	V_{BC} (V)
-10V		
-7.5V		
-5V		
0V		
5V		
7.5V		
10V		

2) Assume a Solar Cell that is 100% efficient. In board daylight, the sun energy is 1kW /m^2 . The area of the Solar Cell is 1 m^2. All energy is converted to electron-hole pairs. With $V_{Applied} = 0$, What amount of current is flowing through the Solar Cell? (I_{solar}).

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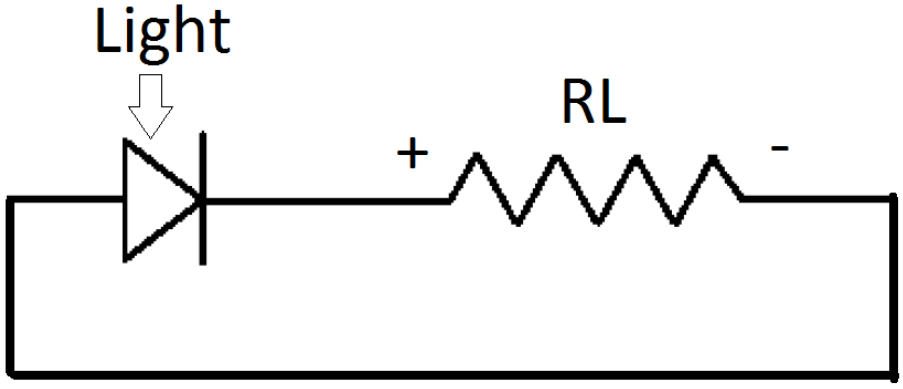
3) Using the following schematic for reference:



Now using: $I_{total} = I_{solar} + I_o(e^{qV_{bi}/kT} - 1)$

Find the available power from the Solar Cell that is delivered to the Load Resistor.

4)For a PN junction with $N_A = 10^{18}$ cm^{-3} and $N_D = 10^{14}$ cm^{-3}.

a)Draw the Band Diagram under 0 Bias, 0.1V Forward Bias, -1V Reverse Bias, and -10V Reverse Bias.

b) Find built in Voltage (V_{bi}) in Volts.