Name:_____

Student ID #:_____

EECS 170A Section B
Homework #4
HW will be collected in DISCUSSION ONLY.
Do not turn your HW in anywhere else, or it will not be accepted.
You are encouraged to turn it in at your own discussion section.
You may turn it in at any discussion section.
Last option to turn in: Right after Friday discussion section December 1, 2006.
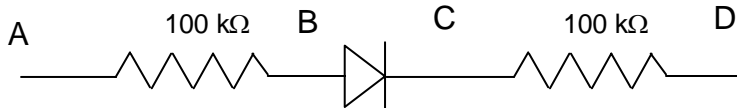DUE: 10 AM Friday, December 1, 2006.

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

1	2a	2b	2c	2d	2e	2f	2g	2h	2i	Total
/46	/6	/6	/6	/6	/6	/6	/6	/6	/6	/100

1) In class we found:

$$I = I_0\left(e^{qV_{diode}/kT} - 1\right)$$

Take $I_0 = 10^{-14}$ A. For the circuit shown, fill in the following table:

V_{AD} (V)	V_{diode} (V)=V_{BC}	I_{AD} (A)
0		
0.5		
1		
1.5		
2		
2.5		
3		
3.5		
4		
4.5		
5		
5.5		
6		
6.5		
7		
7.5		
8		
8.5		
9		
9.5		
10		

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2) For the circuit shown below, find I_B, I_E, I_C, V_C, V_B, V_E, V_{BE}, V_{CE}, V_{BC} defined in figure 10.2 (which one, a or b?) of the text. Hints: the BE voltage drop is about 0.6 V. Take $\beta = 100$. Then $I_C = 100\ I_B$. The rest is just applications of Kirchoff's current and voltage laws. Is the transistor biased in active mode?

V_2

R_2

V_1 R_1

R_3
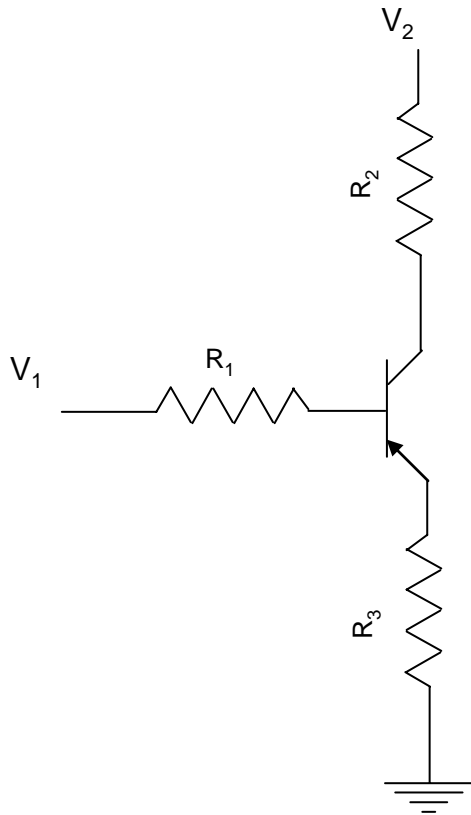
Assuming the transistor is in active mode, find the following quantities in term of R_1, R_2, R_3, V_1, and V_2.

$I_E=$	
$I_B=$	
$I_C=$	
$V_E=$	
$V_B=$	
$V_C=$	
$V_{BE}=$	
$V_{CE}=$	
$V_{BC}=$	

Extra credit: If you are so inclined, can you find a requirement on R_1, R_2, R_3, V_1, and V_2.such that the transistor is in active mode?