Name:_____

Student ID #:_____

ECE 113A
Homework #6
Due 10 A.M. Wednesday, November 26, 2003

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

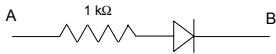| 1	2a	2b	2c	2d	2e	2f	2g	2h	2i	2j	Total
/42	/6	/6	/6	/6	/6	/6	/6	/6	/6	/4	/100

1) In class we made some simplifying assumptions to prove the ideal diode equation:

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

However, in real life things are not quite so simple. Real life diodes usually have I-V curves which can be described as

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

here η is called the "ideality factor". For an ideal diode, $\eta=1$. In the following, I want you to assume that $\eta=0.9$. Also, take $I_0=10^{-14}$ A. For the circuit shown, fill in the following table:
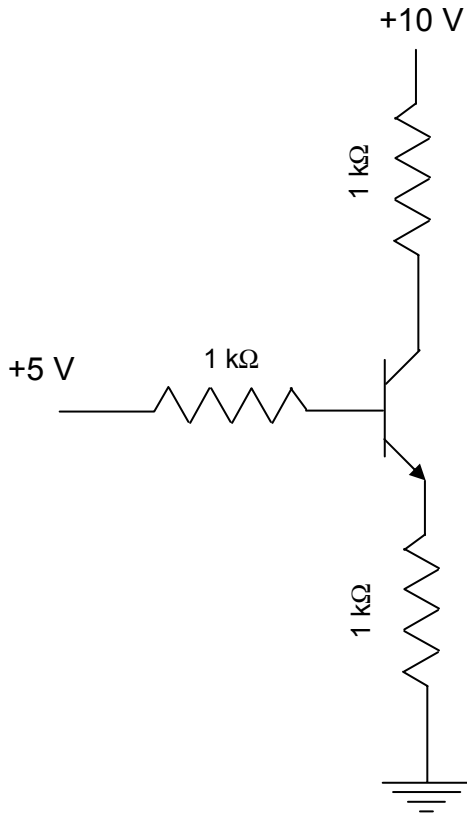

V_{AB} (V)	V_{diode} (V)	I_{AB} (A)
0		
0.5		
1		
1.5		
2		
2.5		
3		
3.5		
4		
4.5		
5		
5.5		
6		
6.5		
7		
7.5		
8		
8.5		
9		
9.5		
10		

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 10.2b 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?

+10 V

1 kΩ

+5 V   1 kΩ

1 kΩ

Please fill out table on this paper. Show your work on attached paper. As usual, no units, no credit.

$I_E=$	
$I_B=$	
$I_C=$	
$V_E=$	
$V_B=$	
$V_C=$	
$V_{BE}=$	
$V_{CE}=$	
$V_{BC}=$	
Active? Y or N	