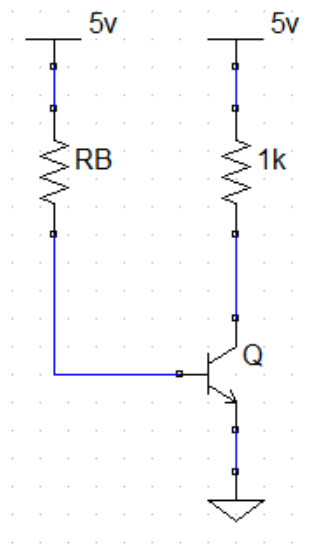


### Sheet 3

### BJT as a switch

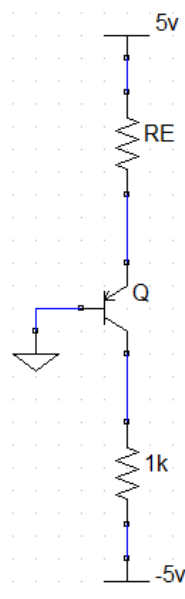
#### Problem (1):

For the circuit shown, select a value for  $R_B$  so that the transistor saturates with an overdrive factor of 10. The BJT is specified to have minimum ( $\beta$ ) of 30 and  $V_{CEsat} = 0.2\text{V}$ . What is the value of forced ( $\beta$ ) achieved?



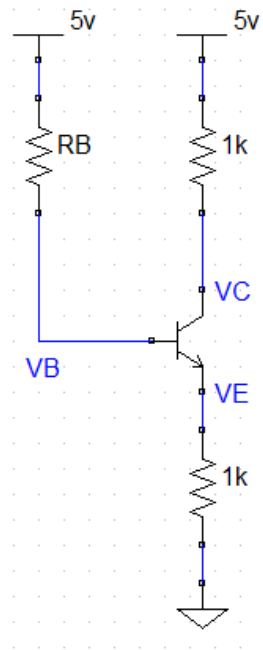
#### Problem (2):

For the circuit below, select a value for  $R_E$  so that the transistor saturates with a forced  $\beta$  of 5.



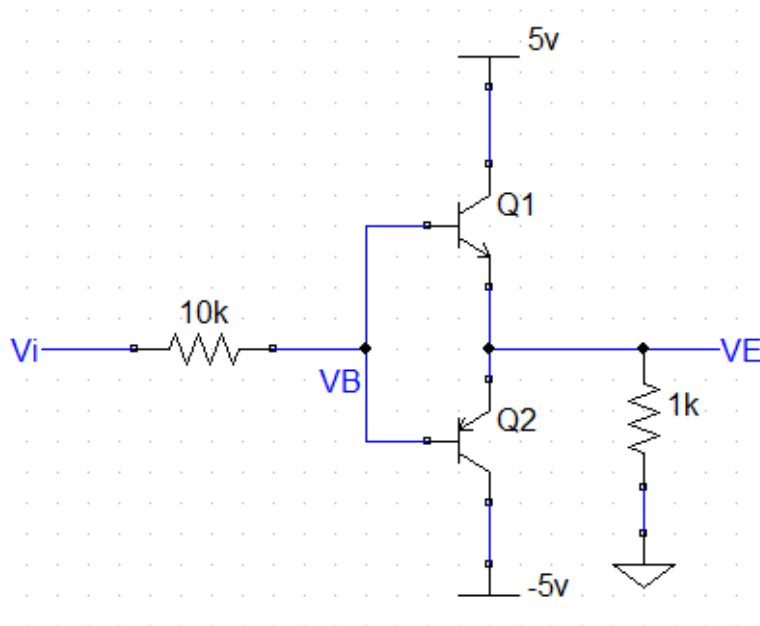
### Problem (3):

For the circuit shown, find  $V_B$ ,  $V_E$  and  $V_C$  for  $R_B = 100\text{ k}\Omega$ ,  $10\text{ k}\Omega$  and  $1\text{ k}\Omega$ . Let  $(\beta) = 100$ .



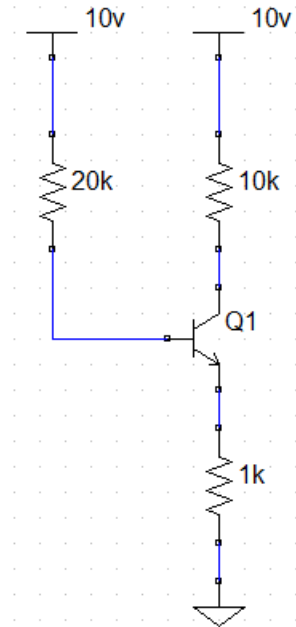
### Problem (4):

For the circuit shown, find  $V_B$  and  $V_E$  for  $V_i = 0, +3\text{ V}, -5\text{ V}$  and  $-10\text{ V}$ . Assume that the BJTs have  $(\beta) = 100$ .

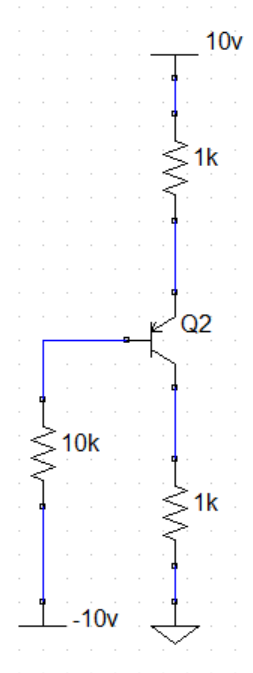


### Problem (5):

Using the three-terminal-short circuit model for a saturated transistor, find the approximate collector voltages in the circuits below. Also, calculate the forced ( $\beta$ ) for each of the transistors.



(a)



(b)

*Good Luck*