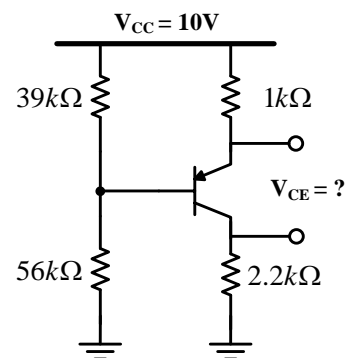
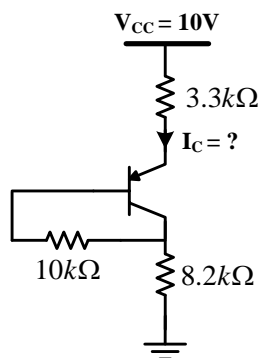
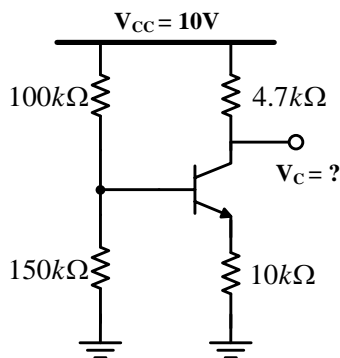
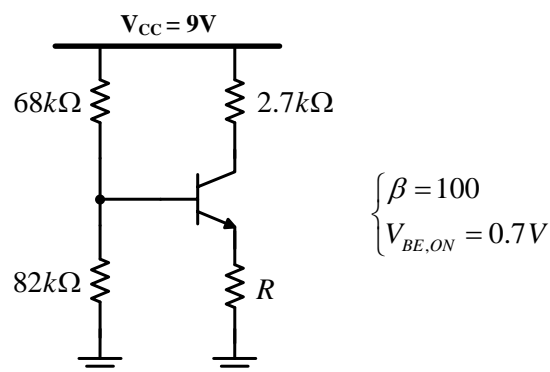


Electronics 1, Assignment #5, Bias point of BJTs.

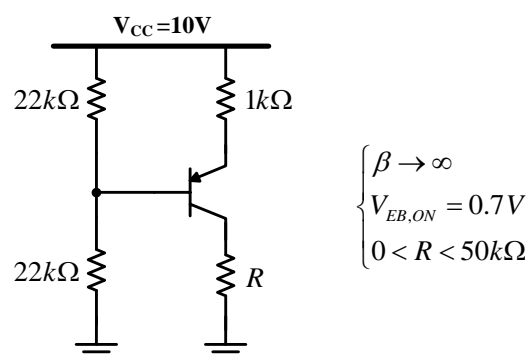
- Calculate the specified unknown parameters in the circuits shown below for the following cases. Suppose  $|V_{BE,ON}| = 0.7V$ ,  $\beta = 100$ .
  - The base current is negligible.
  - The base current cannot be ignored.



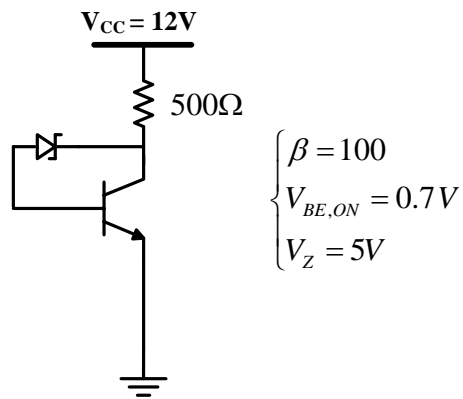
- Specify a range for the value of the resistor,  $R$ , such a way that the transistor will be biased in F.A. region.



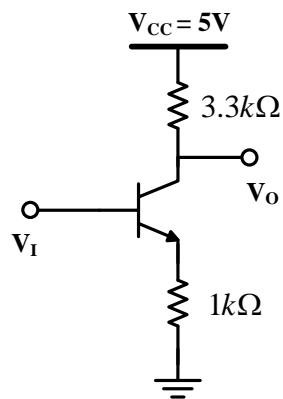
- Plot the  $I_C$  as a function of  $R$  for the following circuit. Specify the operation region of the transistor in the curve.



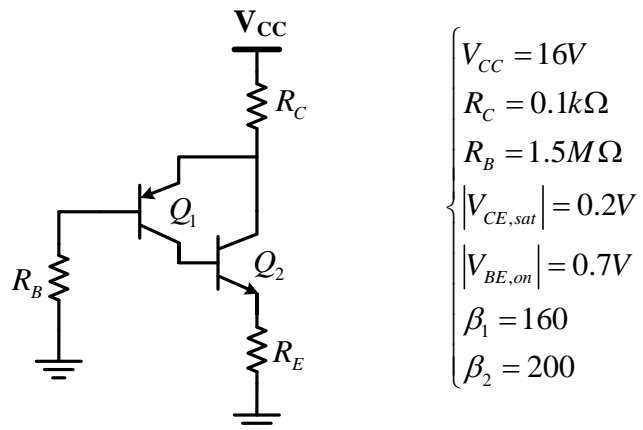
4. Determine the bias point ( $V_{CEQ}$ ,  $I_Q$ ) of the transistor. Consider the zener diode in the reverse breakdown region.



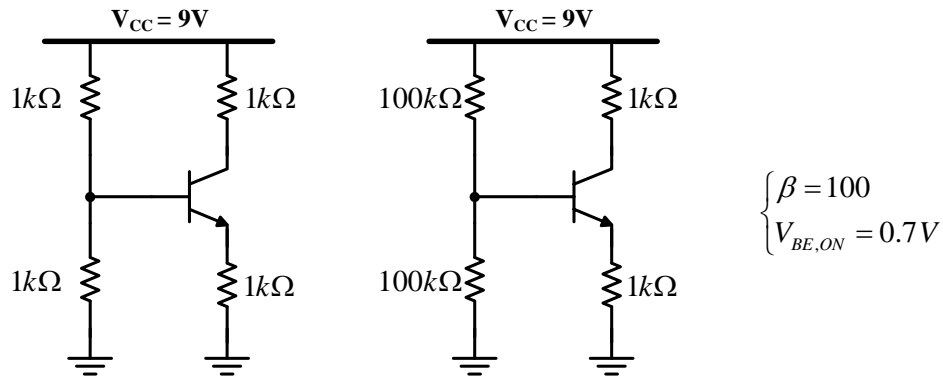
5. Plot the input-output characteristic ( $V_O$ - $V_I$ ) for input voltages spanning from 0 to  $V_{CC}$  ( $0 \leq V_I \leq V_{CC}$ ).



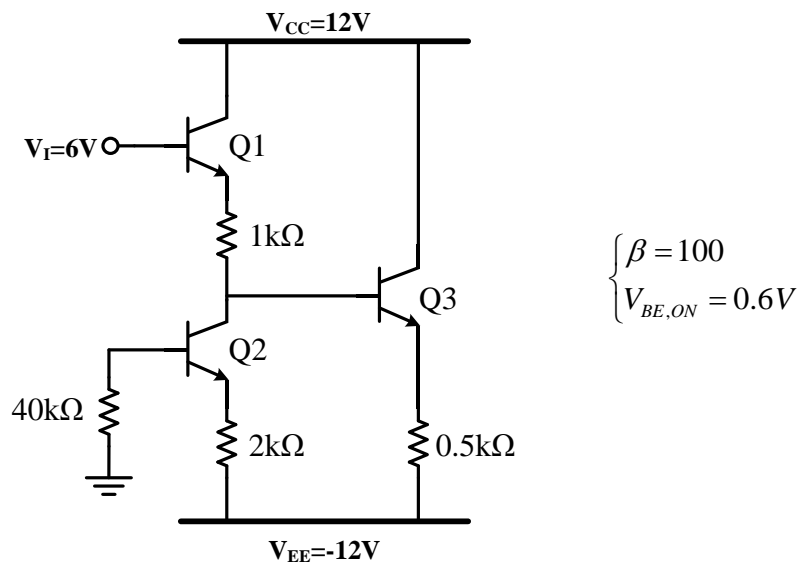
6. a) Determine the bias points of the transistors for the following circuit. Suppose  $R_E = 0$ .  
 b) Prove that, if  $Q_1$  is in F.A. region,  $Q_2$  necessarily should be in F.A. region, too.  
 c) Calculate the maximum value of  $R_E$ , for which  $Q_1$  remains in active region,



7. In which of the following circuits, the base current can be ignored? Prove that.



8. Estimate the bias points of the transistors shown in the circuit below. Assume identical transistors.



9. Estimate the bias points of the transistors shown in the circuit below. Prove that the transistors operate in forward active region.

