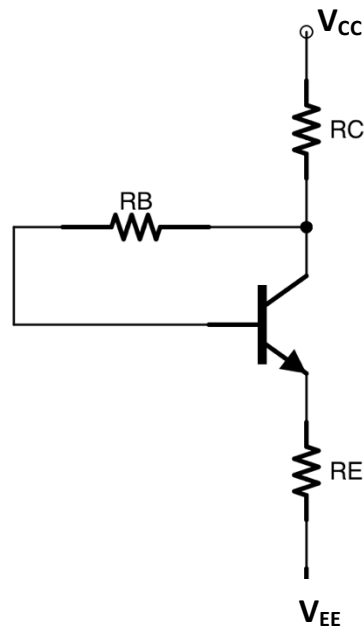


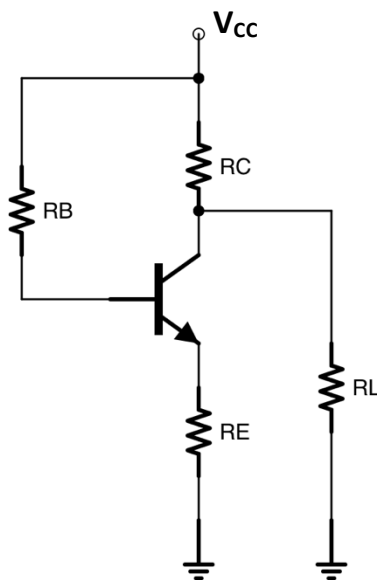
Assignment #1

ENEL469

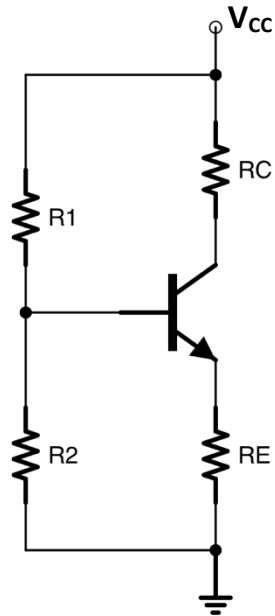
- Consider the following circuit where $V_{CC} = 6V$, $V_{EE} = -6V$, $\alpha = 0.9917356$, $R_C = 1k\Omega$, $R_B = 120k\Omega$, $R_E = 1.2k\Omega$, $V_{CE(Sat)} = 0.2V$, $V_A = 150V$, and $|V_{BE(on)}| = 0.7V$. Determine I_C and V_{CE} .



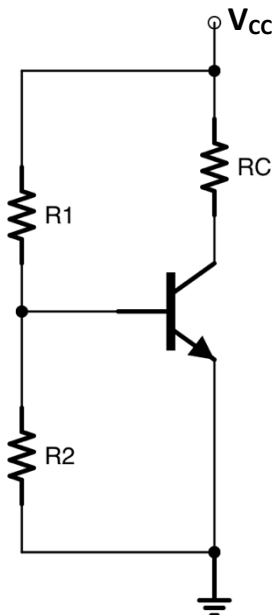
- Consider the following circuit where $V_{CC} = 10V$, $\beta = 140$, $R_C = 1k\Omega$, $R_B = 80k\Omega$, and $R_E = 1k\Omega$, $R_L = 2k\Omega$, $V_{CE(Sat)} = 0.2V$, $V_A = 150V$, and $|V_{BE(on)}| = 0.7V$. Determine I_C and V_{CE} .



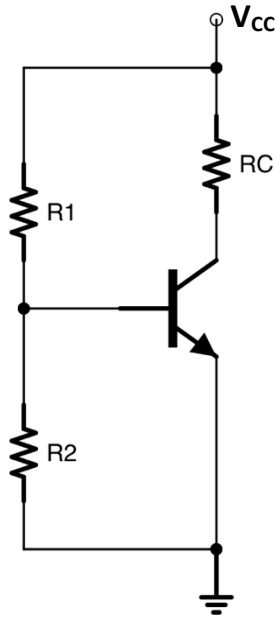
3. Consider the following circuit where $V_{CC} = 14V$, $\beta = 60$, $R_C = 1k\Omega$, $R_1 = 60k\Omega$, $R_2 = 5k\Omega$, $R_E = 0.5k\Omega$, $V_{CE(Sat)} = 0.2V$, $V_A = 150V$, and $|V_{BE(on)}| = 0.7V$. Determine I_C and V_{CE} .



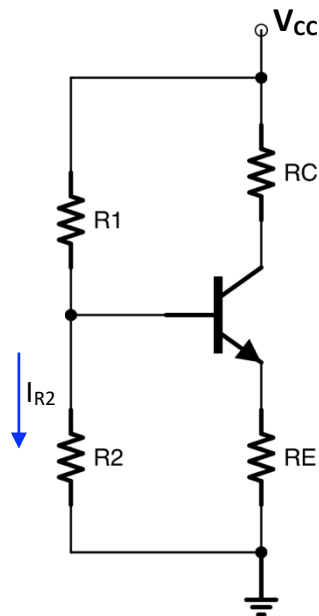
4. Consider the following circuit where $V_{CC} = 8V$, $\beta = 150$, $R_C = 4k\Omega$, $R_1 = 68k\Omega$, $R_2 = 8k\Omega$, $V_{CE(Sat)} = 0.2V$, $V_A = 200V$, and $|V_{BE(on)}| = 0.7V$. Determine I_C and V_{CE} .



5. Consider the following circuit where $V_{CC} = 12V$, $\beta = 60$, $R_C = 2k\Omega$, $R_1 = 45k\Omega$, $R_2 = 4k\Omega$, $V_{CE(Sat)} = 0.2V$, $V_A = 200V$, and $|V_{BE(on)}| = 0.7V$. Assume that the maximum and minimum base currents are $I_{B(max)} = 150\mu A$ and $I_{B(min)} = 5\mu A$. Determine:
- The maximum and minimum values of R_C , which satisfies the base current limits.
Assume all other values remain unchanged
 - The maximum and minimum values of R_2 , which satisfies the base current limits.
Assume all other values remain unchanged
 - The maximum and minimum values of R_1 , which satisfies the base current limits.
Assume all other values remain unchanged



6. Consider the following circuit where $V_{CC} = 20V$, $\beta = 100$, $V_{CE(Sat)} = 0.2V$, $V_A = 230V$, $|V_{BE(on)}| = 0.7V$. Design the circuit (Determine R_1 , R_2 , R_C , and R_E) so that the transistor operates at $V_{CE} = 6V$ and $I_C = 2.5mA$. Given that $R_C = R_E$ and $I_{R2} = 2I_B$.



7. Design the following circuit so that the transistors operate at $I_{C1} = 2mA$, $I_{C2} = 2mA$, $I_{C3} = 4mA$, $V_1 = 2V$, $V_2 = -3V$, and $V_3 = 0V$. Also given that $V_{CC} = 10V$, $V_{EE} = -10V$, $\beta = \infty$ (i.e., ignore base current), $V_{CE(Sat)} = 0.2V$, $V_A = 300V$, and $|V_{BE(on)}| = 0.7V$.

