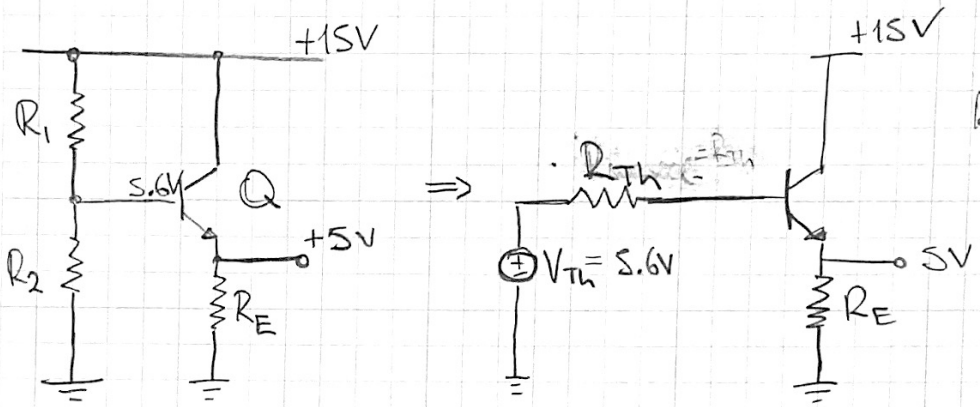
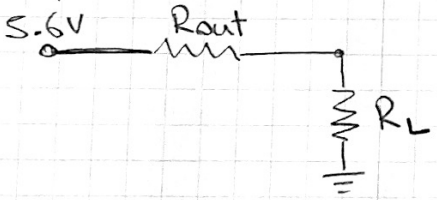
Ex 2.5



$$R_{Th} = \frac{V_{Th}}{15V/R_1} \approx 0.37\, R_1 \qquad = R_1 \,//\, R_2$$

$$R_{out} = \frac{R_{Th}}{\beta + 1} \overset{\beta=100}{=} \frac{R_{Th}}{101}$$

Equivalent circuit with load



$$\frac{R_L}{R_{out}+R_L} \times 5.6V \geq 0.95 \times 5V$$

$$\Rightarrow R_L \geq 0,85\,(R_{out}+R_L)$$

$$\Rightarrow R_L \geq \frac{0,85}{0,15} R_{out} \approx 5,7\, R_{out}$$

$$\Rightarrow R_{out} \leq \frac{R_L}{5,7} \overset{R_{L,min}}{\leq} \frac{4,75V/25mA}{5,7} = \frac{190\Omega}{5,7} \approx 33,3\,\Omega$$

$R_{Th} = 0.37 R_1$

$$\Rightarrow \frac{0.37 R_1}{101} \leq 33,3\Omega \Rightarrow R_1 \leq \frac{3330\Omega}{0,37} = 9k\Omega$$

$$\frac{R_2}{R_1+R_2} = \frac{5.6}{15} \Rightarrow R_2 \approx 0.6\, R_1 \Rightarrow R_2 \leq 5.4k\Omega$$

We pick $R_1 = 9k\Omega$ and $R_2 = 5.4k\Omega$

Note: we could have picked more conservative (smaller) values. This would increase power consumption.