EE303 - Problem Set

Problem 1

Compute the input resistance of the circuits depicted in Fig. 5.105. Assume $V_A = \infty$.

Problem 2

Compute the output resistance of the circuits depicted in Fig. 5.106.

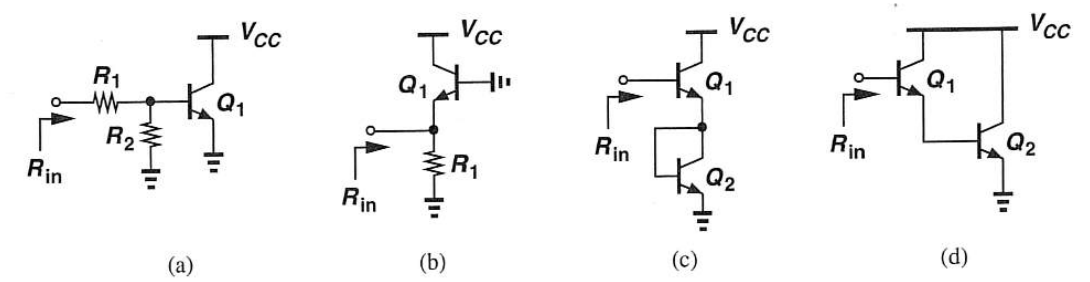

Figure 5.105

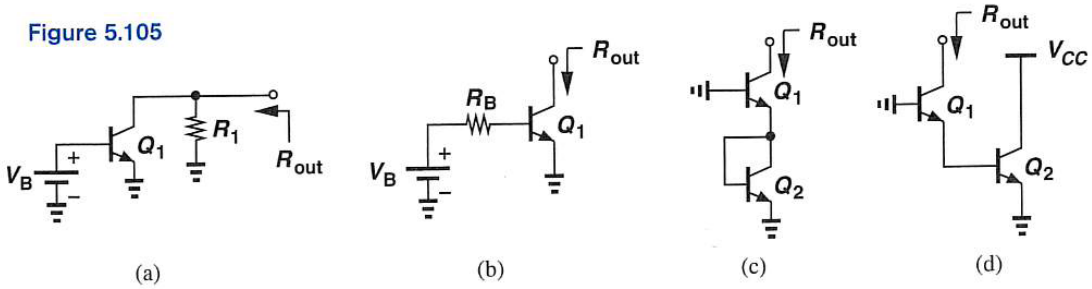

Figure 5.106

Problem 3

Consider the circuit shown in Fig. 5.112, where $\beta = 100$, $I_S = 6 \times 10^{-16}$ A, and $V_A = \infty$.

(a) What is the minimum value of R_B that guarantees operation in the active mode?

(b) With the value found in R_B, how much base-collector forward bias is sustained if β rises to 200?

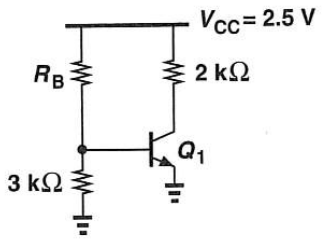

Figure 5.112

Problem 4

The circuit of Fig. 5.115 is designed for a collector current of 0.25 mA. Assume $I_S = 6 \times 10^{-16}$ A, $\beta = 100$, and $V_A = \infty$.

(a) Determine the required value of R_1.

(b) What is the error in I_C if R_E deviates from its nominal value by 5%?

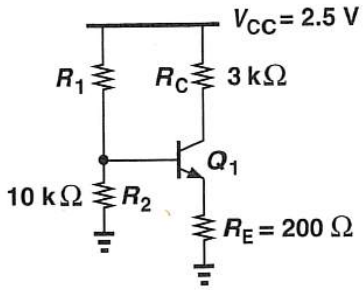

Figure 5.115

Problem 5

In the circuit of Fig. 5.120, $V_X = 1.1$ V. If $\beta = 100$ and $V_A = \infty$, what is the value of I_S?

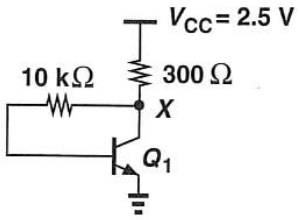

Figure 5.120

Problem 6

If $\beta = 80$ and $V_A = \infty$, what value of I_S yields a collector current of 1 mA in Fig. 5.129?

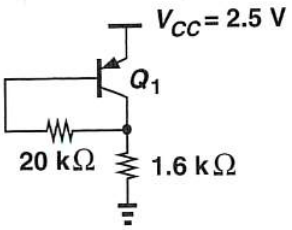

Figure 5.129