Problem 1.
Consider the common-emitter amplifier shown in Fig. 1. The transistor has $\beta = 100$ and $V_A = 100 \text{ V}$.

(a) Calculate $V_B$, $V_C$, $V_E$ and $I_E$.

(b) Calculate $g_m$ and $r_\pi$.

(c) Find $R_{in}$ and the small-signal voltage gain $v_o/v_{sig}$.

(d) Find the small-signal current gain $i_o/i_i$.

Figure 1:

Problem 2.
For the circuit in Fig. 2, find the input resistance $R_{in}$ and the voltage gain $v_o/v_{sig}$. Assume that the source provides a small signal $v_{sig}$ and that $\beta = 100$.

Figure 2:

Problem 3.
For the emitter-follower circuit shown in Fig. 3, the transistor has $\beta = 100$ and $V_A = \infty$. Find:

(a) $I_E$, $V_E$, and $V_B$.

(b) the input resistance $R_{in}$.

(c) the voltage gain $v_o/v_{sig}$.

Figure 3:
**Problem 4.**  
In the circuit shown in Fig. 4, the transistor has a $\beta$ of 200. What is the dc voltage at the collector? Find the resistances $R_{ib}$ and $R_{in}$ and the small signal voltage gain ($v_o/v_{sig}$).

**Problem 5.**  
For the emitter-follower in Fig. 5, the signal is directly coupled to the transistor base. If the dc component of $v_{sig}$ is zero, find the dc emitter current. Assume $\beta = 100$. Neglecting $r_o$, find $R_{in}$, the voltage gain $v_o/v_{sig}$, the current gain $i_o/i_i$, and the output resistance $R_{out}$.