Using the schematic of Fig. 1, determine for the 2N2222, the transistor $\beta_F$ for $I_B=10\mu A$.
by sweeping $V_1$ from $0V$ to $12V$.
Calculate $V_{\text{EARLY}}$ and $r_o$.

Using bias point analysis, find $\beta_{\text{DC}}$ at the Q point $V_{CE}=6V$, $I_B=10\mu A$.

Determine $r_e$ and $r_\pi$ at $V_{CE}=6V$, $I_B=10\mu A$ using the schematic of Fig. 2.

Using the values for $r_o$, $r_\pi$, and $\beta_{\text{AC}}$ found from simulation use a small-signal model to determine the input impedance, output impedance and voltage gain of the emitter follower in Fig. 3.

Determine the simulation values of $Z_{\text{in}}$, $A_v$, and $Z_o$.

In the amplifier of Fig. 4, choose the DC offset voltage $V_{\text{OFF}}$ to optimize the amplifier for AC operation.
Choose the AC voltage $V_{\text{AMP}}$ to generate the largest AC collector voltage that can be achieved without distortion.
Check your result with a simulation.