1. This is based on problem 8.44 in the text. The most straight forward circuit is done by attaching an ideal current source to the emitter with an AC bypass capacitor. The base is excited by an AC voltage source. Simulate the circuit using only the 2N2222 transistor using $I_C = 10 \, \mu A, 100 \, \mu A, 1 \, mA, 10 \, mA, 100 \, mA,$ and $1 \, A$. Look for a trend in $f_t$ vs. $I_C$. Submit at least one sample plot of $i_c/i_b = \beta(\omega)$ vs. frequency. Include also a diagram and net list of the Spice analysis. Some background.

$$\frac{i_c}{i_b} = \beta(\omega) = \frac{\beta_o}{1 + j\omega \beta_o/\omega_t}$$

$$\approx \frac{\beta_o}{|j\omega \beta_o/\omega_t|} = \frac{\omega_t}{\omega}$$

2. This is a design problem based on problem 8.51 (which uses data from 8.50). Here you are to design an amplifier with the basic topology of Fig. 8.41 to have a mid band gain of $A_{vds} = 60$ or 35.56 dB. You should use the Q2N2222 transistor, power supply voltages of $\pm 15 \, V$, generator resistance of 1 kΩ and load resistance of 100 kΩ. The suggested DC values of $V_{CE}$ and $I_C$ are given in the problem, but they should be treated only as a guide. You may find it necessary to modify the bias circuit to make your circuit work. The final goal is to have a voltage gain of 60.