1. **(total 30 points: 15 points, 15 points)**
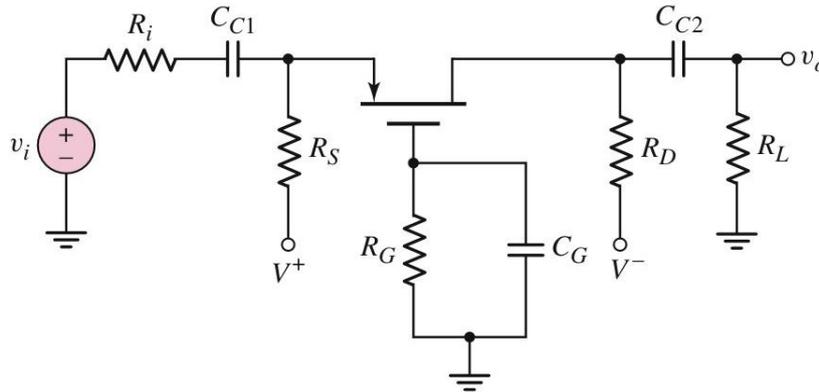
Let $V^+ = 5V, V^- = -5V, R_S = 4k\Omega, R_D = 2k\Omega, R_L = 4k\Omega, R_G = 50k\Omega$, and $R_i = 0.5k\Omega$. The transistor parameters are $K_p = 1mA/V^2, V_{TP} = -0.8V, \lambda = 0, C_{gs} = 4pF$, and $C_{gd} = 1pF$.
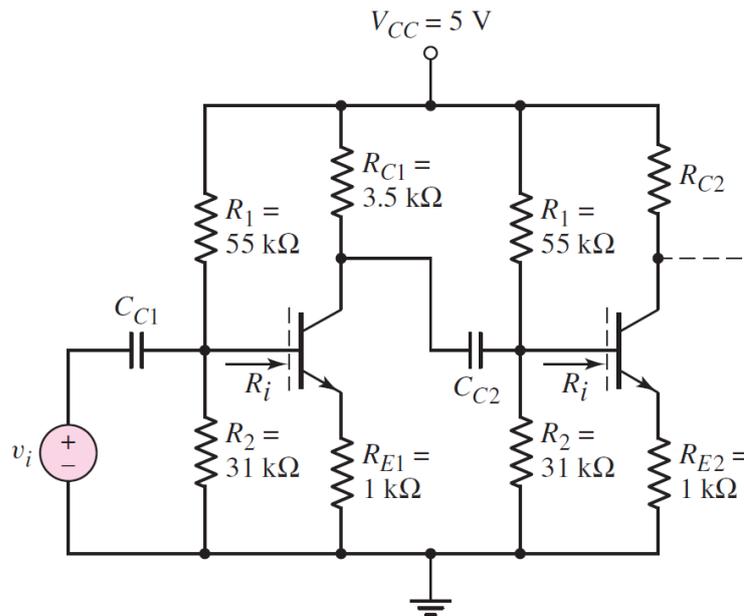
  (a) Determine the upper 3dB frequency. (15%)
  (b) Find the midband voltage gain. (15%)

2. **(total 30 points: 15 points, 15 points)**
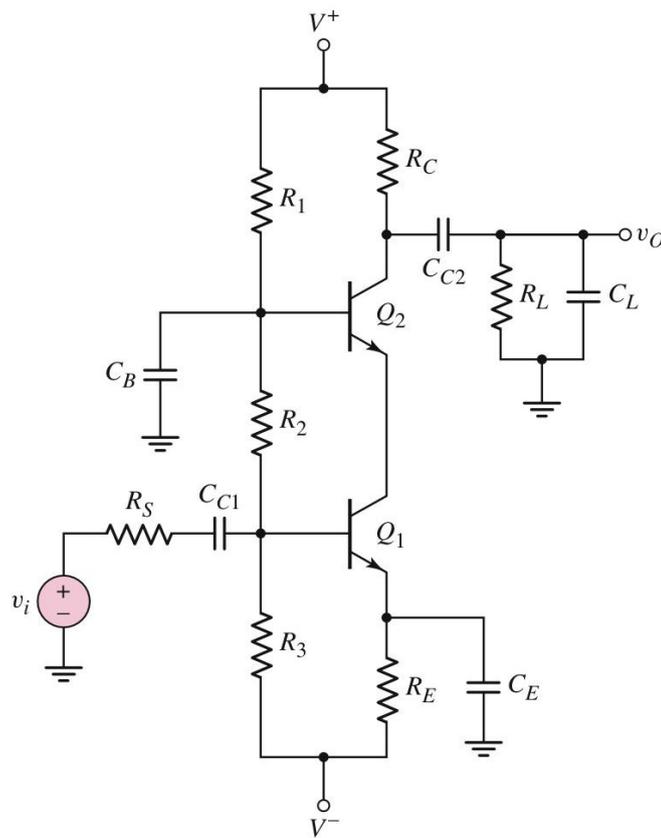
Find C_{C1} and C_{C2} if the 3dB frequencies associated with each stage of the multistage BJT amplifier is to be 20 Hz and the input resistance R_i is the same for each stage.

3. (total 40 points: 5 points, 20 points, 15 points)

Assume that C_{C1}, C_E, C_B and C_{C2} act as short circuits in this high frequency analysis.

(a) Assume that the collector currents of Q_1 and Q_2 are the same. Find the collector current of the transistors. (5%)

(b) The circuit parameters are $V^+ = 12V$, $V^- = 0$, $R_S = 1k\Omega$, $R_1 = 58.5k\Omega$, $R_2 = 33.3k\Omega$, $R_3 = 7.92k\Omega$, $R_E = 0.5k\Omega$, $R_C = 7.5k\Omega$, and $R_L = 2k\Omega$. The transistor parameters are $\beta = 100$, $V_{BE(ON)} = 0.7V$, $V_A = \infty$, $C_\pi = 24pF$, and $C_\mu = 3pF$. Determine the 3dB frequencies corresponding to the input and output portions of the equivalent circuit for C_L acting as an open circuit. (20%)

(c) Derive the midband voltage gain. (15%)