Determine low and high critical bandwidth-limiting frequencies for the circuit below.

a) \( f_{L1} \), due to \( C_1 \)

b) \( f_{L2} \), due to \( C_2 \)

c) \( f_H \)

\( \beta = 108 \quad r_e = 25 \quad C_{bc} = 8 \text{ pF} \quad C_{be} = 22 \text{ pF} \)

\( A_{Vbc} = 149 \) midband voltage gain from base to collector

\[ f_{L1} = \frac{1}{2\pi R_T C_T} = 212.3 \text{ Hz} \]

\( C_T = C_1 \)

\( R_T = R_s + R_9/\left( R_10/(1 + \beta) r_e \right) = 7498 \)

\[ f_{L2} = \frac{1}{2\pi R_T C_T} = 26.53 \text{ Hz} \]

\( C_T = C_2 \)

\( R_T = R_C + R_{11} \)

\[ f_H = \frac{1}{2\pi R_T C_T} = 78.19 \text{ kHz} \]

\( C_T = C_{be} + (1 + 149)C_{bc} = 1222 \text{ pF} \)

\( R_T = R_s/\left( R_9/(1 + \beta) r_e \right) = 1665.8 \)
Determine the dc or average output voltage level.

Determine the ac output voltage peak-to-peak.

Draw the output voltage waveform and label the dc and ac voltage levels and +/- peaks.

\[ V_{o\ dc} = -1v + (-1v \times \frac{5k}{2k}) = -3.5V \]

\[ V_{o\ ac} = -50mV \times \frac{5k}{2k} = 250mv \text{ p-p} \]
3. For this circuit plot the output voltage in decibels vs. frequency on a log scale. Determine and label the following:
   a) Break frequency
   b) Slope in dB/decade of each line segment
   c) dB level of the flat portion of the plot

39.8 kHz
-20dB/decade
0dB