1. A receiver input stage is shown below. Calculate the maximum interfering signal voltage at \( V_i \) for \( IM_3 < 1\% \).

2. Calculate \( IM_2 \) and \( IM_3 \) in the circuit shown below, for two sinusoidal voltages of peak amplitude 300 mV each applied at \( V_i \). Check with SPICE by simulating \( HD_2 \) and \( HD_3 \).
3. A feedback amplifier is shown below.

\[
\begin{align*}
\beta_0 &= 100 \\
I_s &= 10^{-16} A
\end{align*}
\]

\[V_o\]

a) Calculate the small-signal voltage gain of the circuit and the loop gain at \( f = 1\text{MHz} \).

b) Calculate \( HD_2 \) in \( V_o \) for a 1V peak-peak sinusoidal output voltage at \( f = 1\text{MHz} \), assuming \( Q_1 \) is the major source of distortion. Check with SPICE.