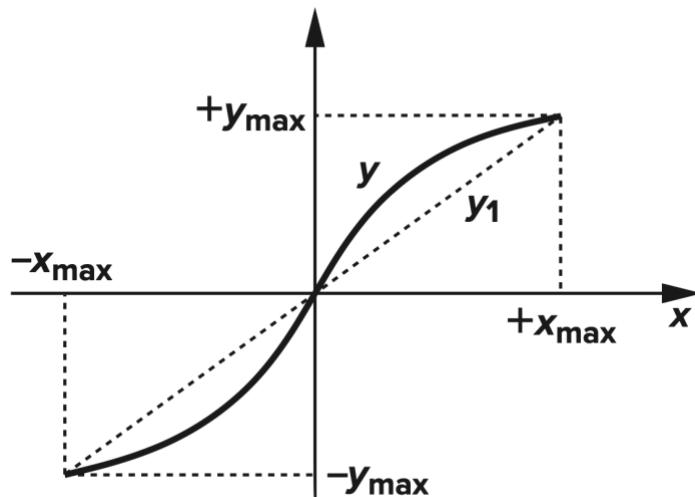


EE-523 – Exercise 4

1. The input/output characteristic of a differential amplifier is approximated as: $y(t) = \alpha_1 x(t) + \alpha_3 x^3(t)$. Calculate the maximum nonlinearity if the input range is from $x = -x_{\max}$ to $x = +x_{\max}$.



2. A common-source stage biased at a current I_1 experiences an input voltage swing that varies the drain current from $0.75I_1$ to $1.25I_1$. Calculate the variation of the small-signal voltage gain: (a) with no degeneration, and (b) with degeneration such that $gm_{RS} = 2$, where gm denotes the transconductance at $I_D = I_1$.

3. Calculate the input-referred offset voltage of the circuit shown below. Assume all transistors operate in saturation.

