

ENEE 434 Homework 1 (for grading)

Due Tu 02/08/05

#1. 25 points (simulink for activation functions)

For all but the Competitive activation functions of the table of page 2-17 (there called Transfer Functions):

1) Calculate by hand the first, second and third derivatives putting them into a table with the same ordering as on p. 2-17.

2) Set up Simulink to plot the transfer functions and plot them versus n for $-5 < n < 5$.

[submit a printout for both the Simulink set up and the resulting plot for each]

#2. 25 points (CMOS differential pair activation function)

The following activation function is a normalized form of that resulting from an MOS differential pair realization where I_T is the tail current.

$$a(n) = \begin{cases} -I_T & n < -I_T \\ n\sqrt{(2I_T - n^2)} & -I_T < n < I_T \\ I_T & I_T < n \end{cases}$$

Assume that I_T is normalized to 1.

1) Sketch $a(n)$ versus n for $-5 < n < 5$ labeling important points on both axes

2) Calculate the first, second and third derivatives and similarly sketch them.