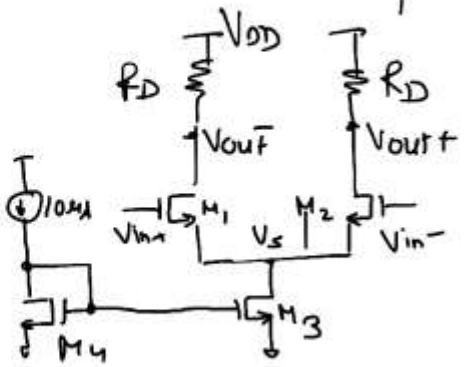
Assignment 5

Assignment - - Diffamp Basics

Part (1)



$M_1 = M_2 = \frac{10u}{180n}$

$M_3 = M_4 = \frac{20u}{300n}$

$R_D = 50K$

(1) Fix $V_{in}^- = 0.6V$, sweep V_{in}^+ from 0 to V_{DD}, obtain the plot for V_{out}^+, V_{out}^- and V_s

(2) Apply a fully differential signal (V_{in}^+: 1mV p-p, V_{in}^-: -1mV pp) (freq = 100K) with common mode DC = 0.6V. Obtain the output differential signal and V_s plot.

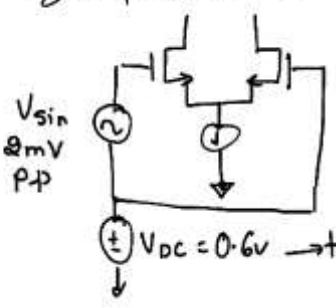
(3) Apply a common-mode sin signal of magnitude 10mV p-p with common mode DC = 0.6V, obtain the common mode output signal.

Hint → How to apply differential sin signal?

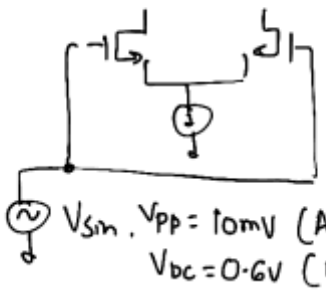
(4) Try to increase gain of the diffamp (differential A_d) by 2x. by appropriate changes.

HINT:

How to apply differential sin signal?



How to Apply V_{cm} signal?



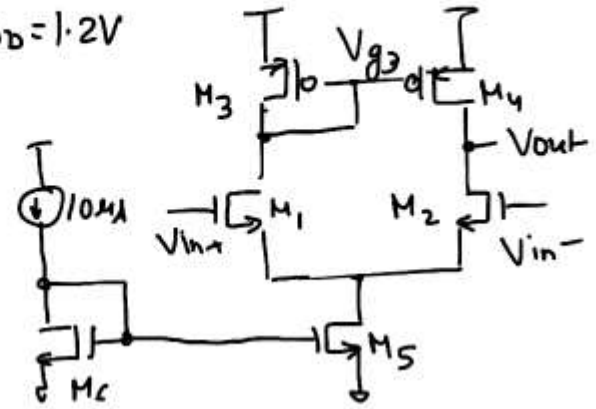
Part (2)

$M_1 = M_2 = \frac{10u}{180n}$

$M_3 = M_4 = \frac{5u}{180n}$

$M_6 = M_5 = \frac{20u}{300nm}$

$V_{DD} = 1.2V$



(1) Find ICMR using DC sweep

(2) For $V_{in\_DC} = 0.6V$, find A_{dif} and A_{cm} using frequency response (AC. analysis) and validate using transient simulation. Observe the transient signal at V_{g3}

(3) Try to increase A_{dif} by 2x and reduce A_{cm} by 2x using appropriate modifications.

(4) Connect the diffamp in unity gain configuration & obtain Vout Vs Vin curve using DC sweep.