

## Homework Assignment No. 8

Due March 1, 2004 in class

Problem 1 - (10 points)

Problem 6.5-15 of AH

Problem 2 – (10 points)

Problem 6.28 of GHLM

Problem 3 – (10 points)

Problem 6.29 of GHLM

Problem 4 – (10 points)

Problem 6.30 of GHLM

Problem 5 – (10 points)

A two-stage, BiCMOS op amp is shown. For the PMOS transistors, the model parameters are  $K_P' = 50 \mu\text{A}/\text{V}^2$ ,  $V_{TP} = -0.7\text{V}$  and  $\mu_p = 0.05\text{V}^{-1}$ . For the NPN BJTs, the model parameters are  $\beta_F = 100$ ,  $V_{CE}(\text{sat}) = 0.2\text{V}$ ,  $V_A = 25\text{V}$ ,  $V_t = 26\text{mV}$ ,  $I_s = 10\text{fA}$  and  $n=1$ . (a.) Identify which input is positive and which input is negative. (b.) Find the numerical values of differential voltage gain,  $A_v(0)$ ,  $GB$  (in Hertz), the slew rate,  $SR$ , and the location of the RHP zero. (c.) Find the numerical value of the maximum and minimum input common mode voltages.

