Due in the "EE 105 box" near 125 Cory Hall by 5pm on Friday 11/16/2012.

Read Sections 10.1–3 & 11.7–10 in B. Razavi: Fundamentals of Microelectronics

Use the following parameters in all problems, unless otherwise specified (problems from B. Razavi: Fundamentals of Microelectronics use the parameters specified in B. Razavi: Fundamentals of Microelectronics):

Device	Parameter values
BJT	$I_s = 1\,\text{fA}$, $\beta = 100$, and $V_A = 100\,\text{V}$
N/PMOS	$\lvert V_{TH}\rvert = 400\,\text{mV}$, $C_{ox} = 10\,\text{fF}/\mu\text{m}^2$, $C_{ol} = 0.2\,\text{fF}/\mu\text{m}$, $\lambda = 0.02\,\text{V}^{-1}$, $\gamma = 0\,\text{V}$, $L_{\min} = 180\,\text{nm}$
NMOS	$\mu_n = 300\,\text{cm}^2/\text{Vs}$
PMOS	$\mu_p = 150\,\text{cm}^2/\text{Vs}$

Unless otherwise specified, assume room temperature and $V_t = 25\,\text{mV}$.

1. Do the Exercise after Example 10.3 in B. Razavi: Fundamentals of Microelectronics.

2. Redo Example 10.4 in B. Razavi: Fundamentals of Microelectronics after replacing the BJTs with MOS transistors sized such that $V_d^{sat} = V_{GS} - V_{TH} = 250\,\text{mV}$.

3. Calculate the small-signal transconductance of a BJT differential pair with tail current $I_{EE} = 1\,\text{mA}$ for $V_{in1} - V_{in2} = 0\,\text{V}$. Repeat for $V_{in1} - V_{in2} = 100\,\text{mV}$. The BJTs are biased in the forward active region.

4. Do the Exercise after Example 10.6 in B. Razavi: Fundamentals of Microelectronics.

5. Do the Exercise after Example 10.7 in B. Razavi: Fundamentals of Microelectronics.

6. Do the Exercise after Example 10.9 in B. Razavi: Fundamentals of Microelectronics.

7. Do the Exercise after Example 10.11 in B. Razavi: Fundamentals of Microelectronics.

8. Do the Exercise after Example 10.13 in B. Razavi: Fundamentals of Microelectronics.

9. Do the Exercise after Example 10.14 in B. Razavi: Fundamentals of Microelectronics.

10. Do the Exercise after Example 10.16 in B. Razavi: Fundamentals of Microelectronics.

11. Do the Exercise after Example 10.22 in B. Razavi: Fundamentals of Microelectronics.

12. Do the Exercise after Example 10.24 in B. Razavi: Fundamentals of Microelectronics.

13. Do Problem 10.51 in B. Razavi: Fundamentals of Microelectronics.

14. Do the Exercise after Example 11.25 in B. Razavi: Fundamentals of Microelectronics.

15. Do the Exercise after Example 11.27 in B. Razavi: Fundamentals of Microelectronics.

16. Do Problem 11.59 in B. Razavi: Fundamentals of Microelectronics.