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):

<table>
<thead>
<tr>
<th>Device</th>
<th>Parameter values</th>
</tr>
</thead>
<tbody>
<tr>
<td>BJT</td>
<td>$I_s = 1 \text{fA}$, $\beta = 100$, and $V_A = 100 \text{V}$</td>
</tr>
<tr>
<td>N/PMOS</td>
<td>$</td>
</tr>
<tr>
<td>NMOS</td>
<td>$\mu_n = 300 \text{cm}^2/\text{Vs}$</td>
</tr>
<tr>
<td>PMOS</td>
<td>$\mu_p = 150 \text{cm}^2/\text{Vs}$</td>
</tr>
</tbody>
</table>

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


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

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.


