Sheet 2: Bipolar Differential Pair

1. A bipolar differential pair has R_C = 1 KΩ and I_{EE} = 1 mA. Calculate the minimum value of (V_{CC}- V_{CM}) to avoid saturation, then estimate the upper limit of V_{CM}.

2. A bipolar differential pair has R_C = 1 KΩ, V_{cc} = 2.5 V and I_{EE} = 0.5 mA. What is the maximum base voltage if the differential input is large enough to completely steer the tail current.

3. For a bipolar differential pair amplifier, determine the differential input voltage that steers 98% of the tail current to Q_2.

4. Design a bipolar differential pair amplifier to provide that V_{od} =(V_{o1}-V_{o2}) = 1 V when V_{id} = 10 mV. Where I_{EE} = 2 mA, V_{CC} = 10 V.

5. For a bipolar differential pair amplifier, calculate I_{C1}, I_{C2}, and hence (V_{C2}-V_{C1}). Where IR_C = 5 V and V_{id} = 10 mV