



Current Mirror

Q1. Figure 1 shows 2 current source topologies. For both these circuits,

- Find R_{out} .
- Find minimum output voltage which doesn't spoil the operation.
- What is the minimum output value of V_B which maximizes the output voltage swing of the modified cascode current mirror? What is the minimum output voltage of this current mirror for this V_B ?
- Compare both these circuits.

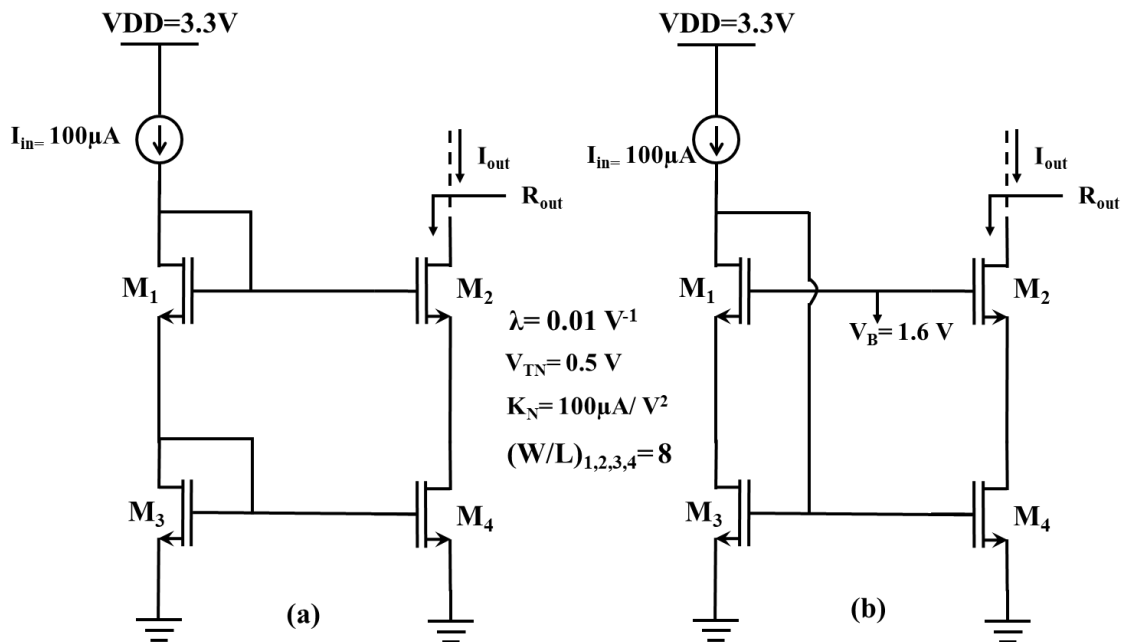


Figure 1. CMOS cascode current mirrors (a) conventional, (b) modified

Q2. Figure 2 shows current reference circuit, find expressions for bias and output currents in terms of K_{N1} , K_{N2} , K_{N3} , K_{P4} , K_{P5} , K_{P6} , V_{TN} , V_{TP} and R .

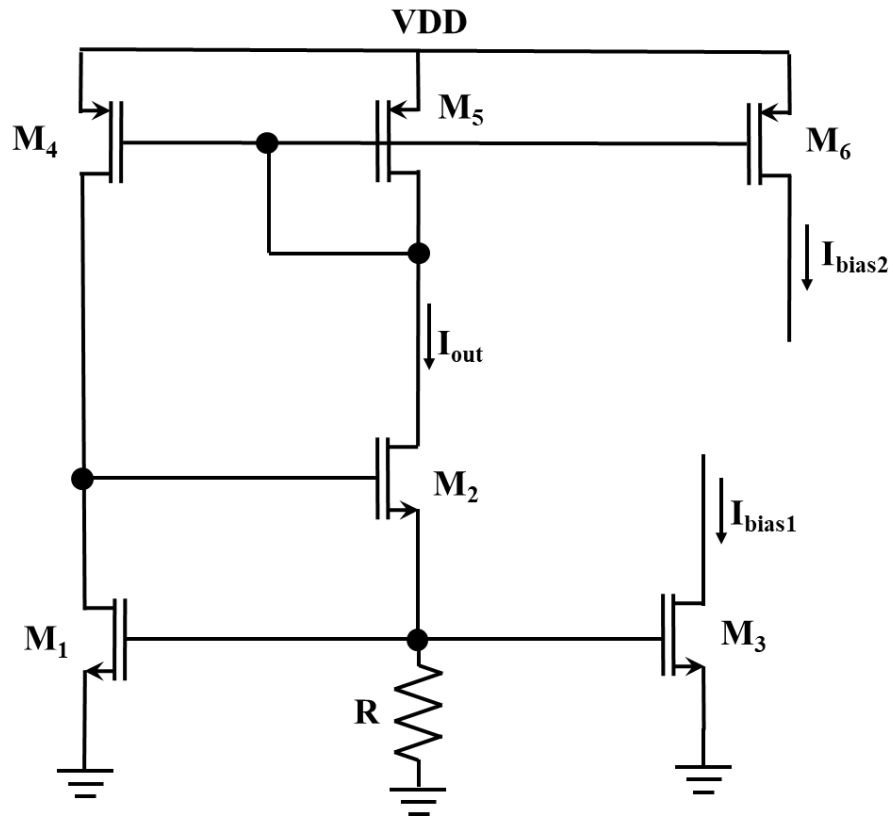


Figure 2. Current reference circuit