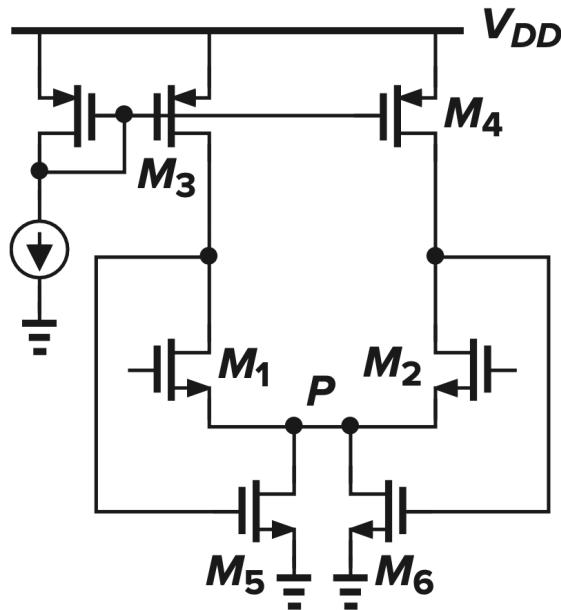
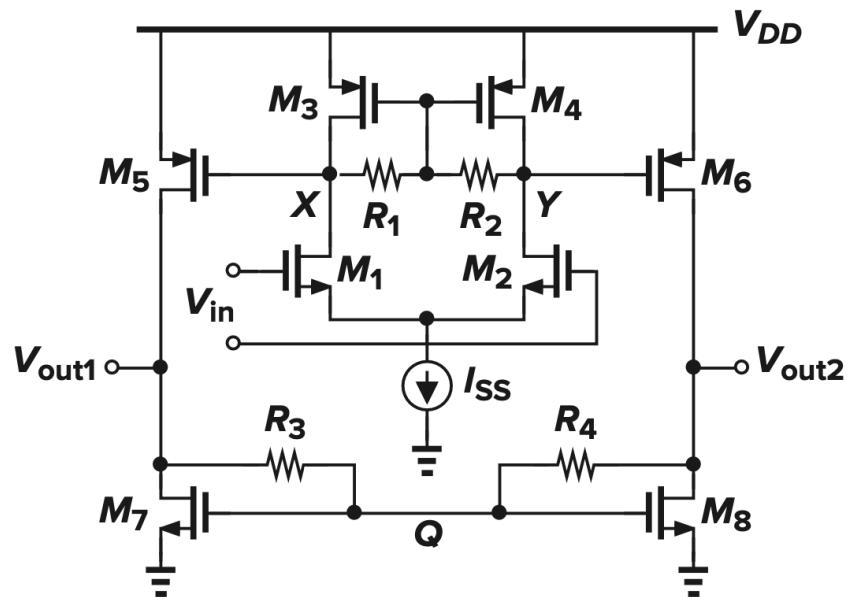


EE-523 – Exercise 2

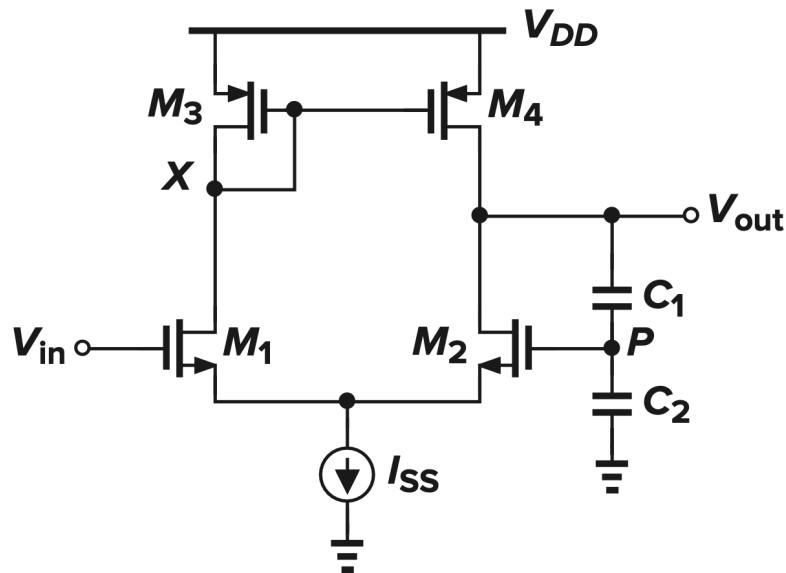
1. In the following circuit, due to voltage headroom limitations, the tail current source is replaced by two triode devices that sense the output CM level, $V_{out,CM}$. Determine the small-signal gain from the input CM level to the output CM level. Assume (for simplicity) that $\lambda = \gamma = 0$ for M_1 and M_2 .



2. Calculate the differential voltage gain of the following circuit with CMFB in each stage.



3. Calculate the low-frequency PSRR of the feedback circuit shown below. To simplify the calculations, you can neglect channel-length modulation in M_1 – M_3 .



4. Assuming that all transistors are in saturation and $(W/L)_{1,2} = 50/0.6$, $(W/L)_{3,4} = 10/0.6$, find the equation for the input-referred noise voltage of the following amplifier. Assume $\mu nCox = 75 \mu A/V^2$, $\mu pCox = 30 \mu A/V^2$, and $\gamma = 2/3$.

