Lecture 18 – MOSFET Differential Amplifiers

18.1) MOSFET Differential Pair

The differential pair is an important circuit building block because it is commonly used as the differential input of an operational amplifier. We shall focus on the MOSFET differential pair but bipolar transistors can also be used to form a differential input stage.
18.2) Common-Mode Operation of the MOSFET Differential Pair

\[ v_{D1} = V_{DD} - \frac{I}{2}R_D \]

\[ v_{D2} = V_{DD} - \frac{I}{2}R_D \]

\[ V_{GS} = V_t + V_{OV} \]

\[ = V_t + \sqrt{I/\left(k_n^W/L\right)} \]
18.3) **Small-Signal Gain of the Differential Amplifier**