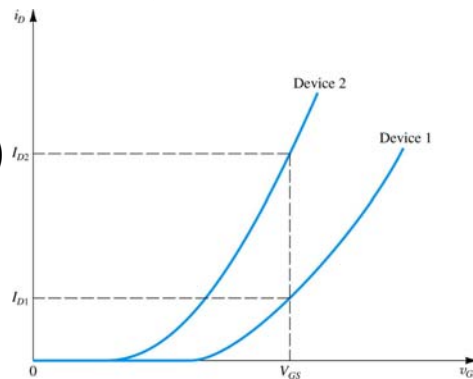# Biasing in MOS Amplifiers

- How to choose the operating point?
- Want a stable Q-point (known $I_D$ and $V_{DS}$) to ensure operation in the saturation region.
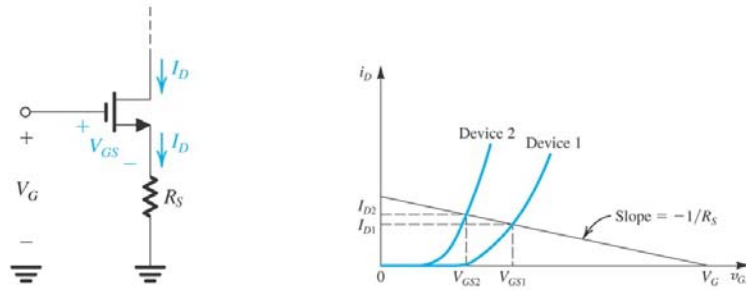
# Biasing -- Fixing V$_{GS}$

- $I_D$ depends on $\mu$, $C_{ox}$, $W/L$ and $V_t$, and $V_{GS}$
- $C_{ox}$, $V_{GS}$ ( even $W/L$) can vary across devices of the same type.
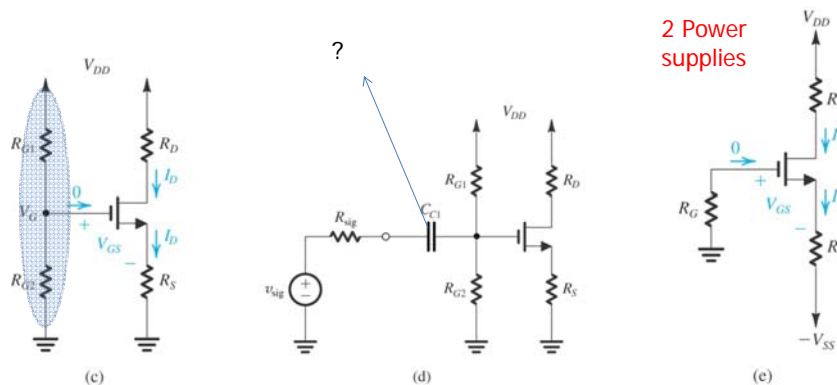- Not a good idea to.
- Many parameters(t)

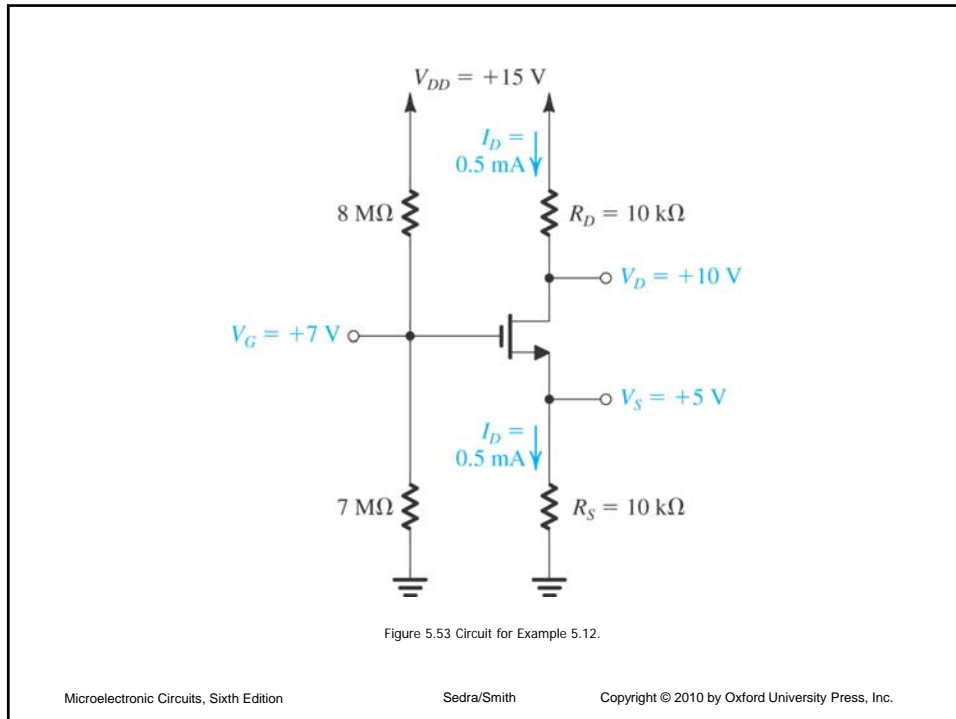# Biasing – Fixing $V_G$ and $R_S$

- $R_S$ provides a negative feedback to stabilize $I_D$
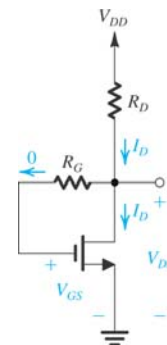


# Biasing – Fixing $V_G$ and $R_S$

- Uses one power supply
- What is the effect on input resistance when you add $v_{gs}$ signal

Figure 5.53 Circuit for Example 5.12.

# Biasing – D-to-G Resistor

- $V_{GS} = V_{DS} = V_{DD} - I_D R_D$
- $V_{DD} = V_{GS} + I_D R_D$
- Provides a feedback resistor to
Stabilize $I_D$
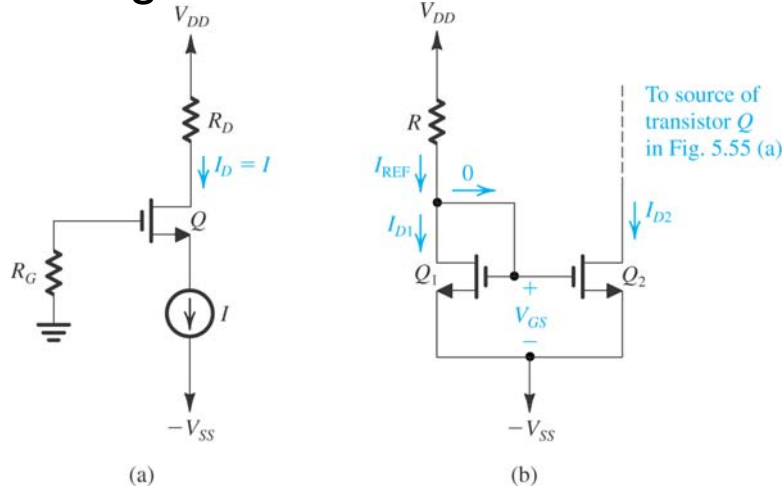
# Biasing – Constant Current Source



Figure 5.55 (a) Biasing the MOSFET using a constant-current source *I*. (b) Implementation of the constant-current source *I* using a current mirror.

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# Frequency Response