Lecture20:
Source follower

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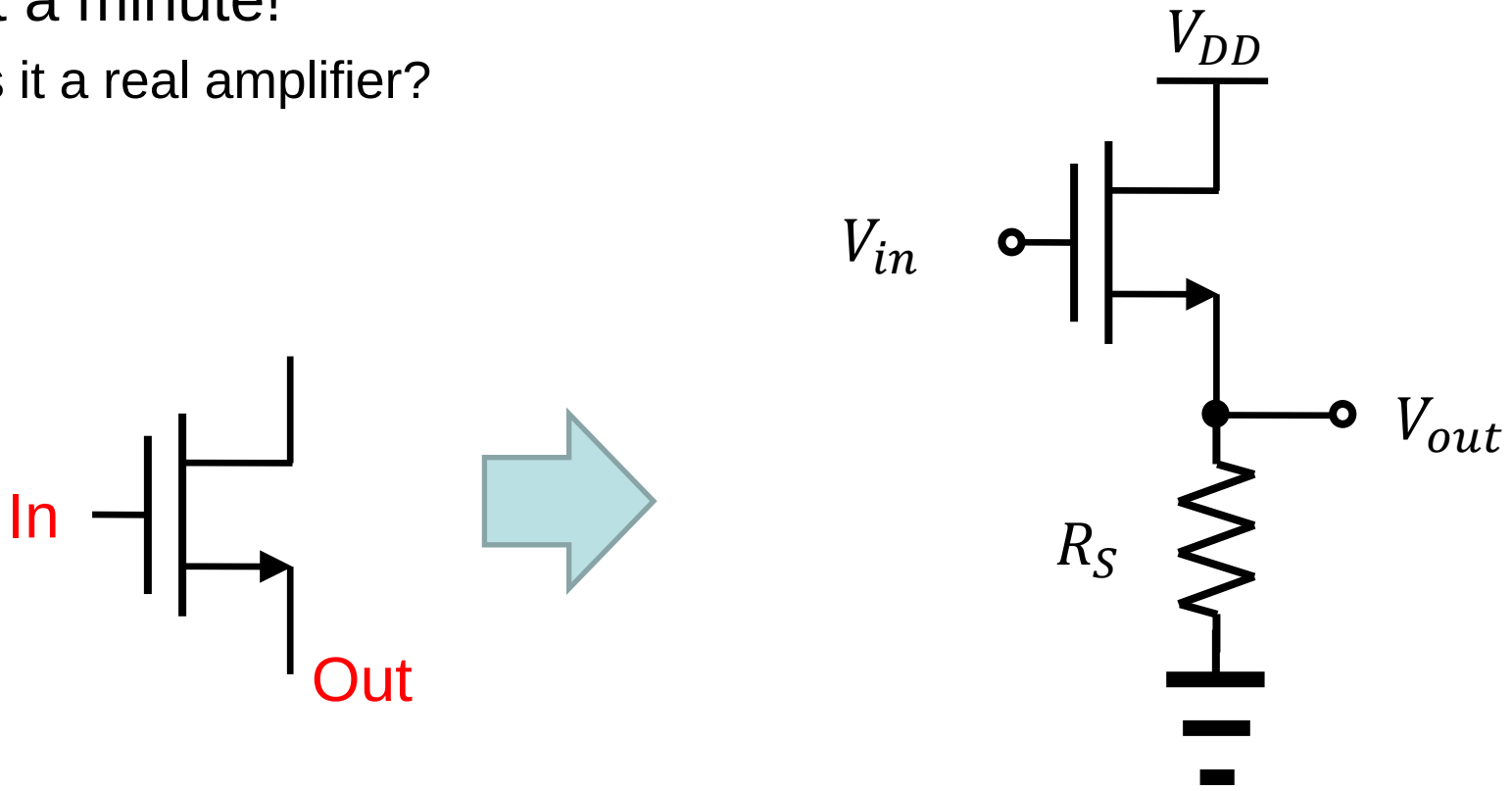
Source follower

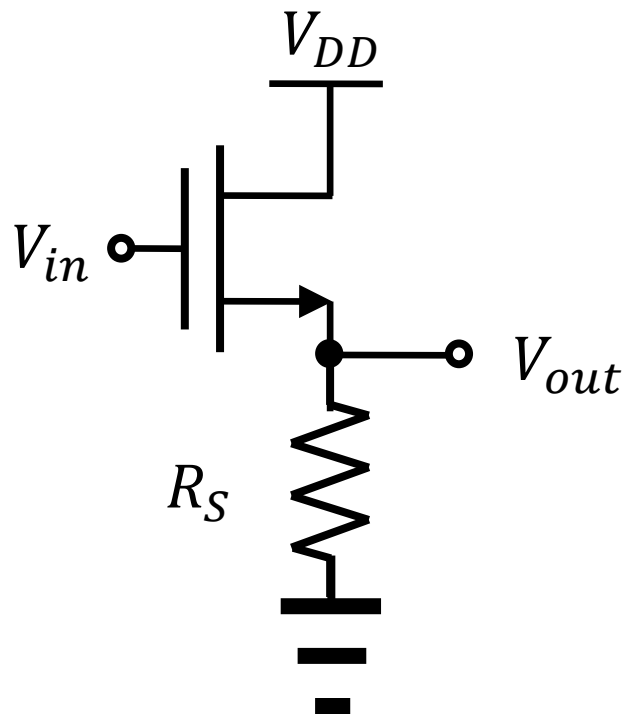
- Also called the “common-drain” stage
  - The drain is ac grounded.
- Wait a minute!
  - Is it a real amplifier?



Its core

- Gain is less than 1?? (Neglecting r_O)

$$A_v = +\frac{g_m R_S}{1 + g_m R_S}$$



You should be able to draw the small-signal model.

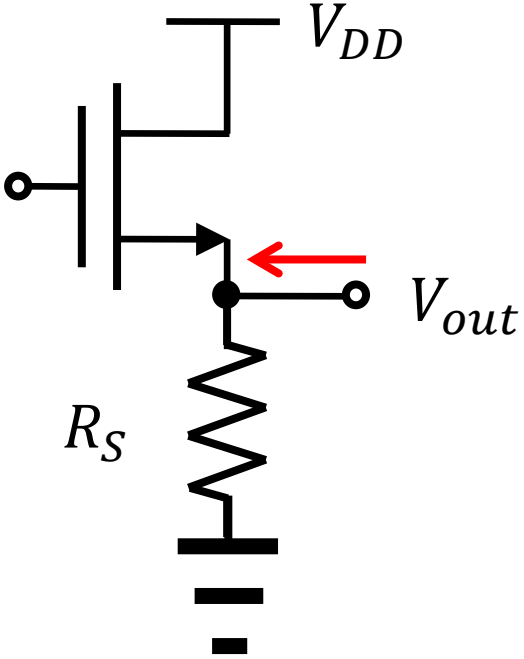
Useless?

- Calculate the input and output impedances.
  - Since the gate is the input terminal, the input impedance is very high at low frequencies.
  - How about the output impedance?

$$R_{out} = \frac{1}{g_m} || r_O || R_S$$

  - It is relatively low.

- High input imp., low output imp.
  - They can serve as good “buffers.”



Razavi, example 17.39

- Design the source follower.
  - Determine W/L and R_S.
  - The DC drain current is 1 mA.
  - The voltage gain is 0.8.