

1. Consider an NMOS transistor with $L_{eff}=25\text{nm}$ and $V_{ds}=1\text{V}$

(a) What is the electrical field (F) in $\text{V}/\mu\text{m}$ in the channel between source and drain?

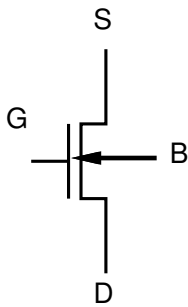
$(F = V/L)$

(b) With an electron mobility of $\mu_n=500 \text{ cm}^2/(\text{V} \cdot \text{s})$, what is the velocity of the electron in this field? (in m/s)?

(velocity $v = \mu \times F$)

(c) At what V_{ds} voltage does the velocity reach 10^5 m/s ?

2. How many capacitance values might we need to represent a 4-terminal transistor? (fourth terminal is body)

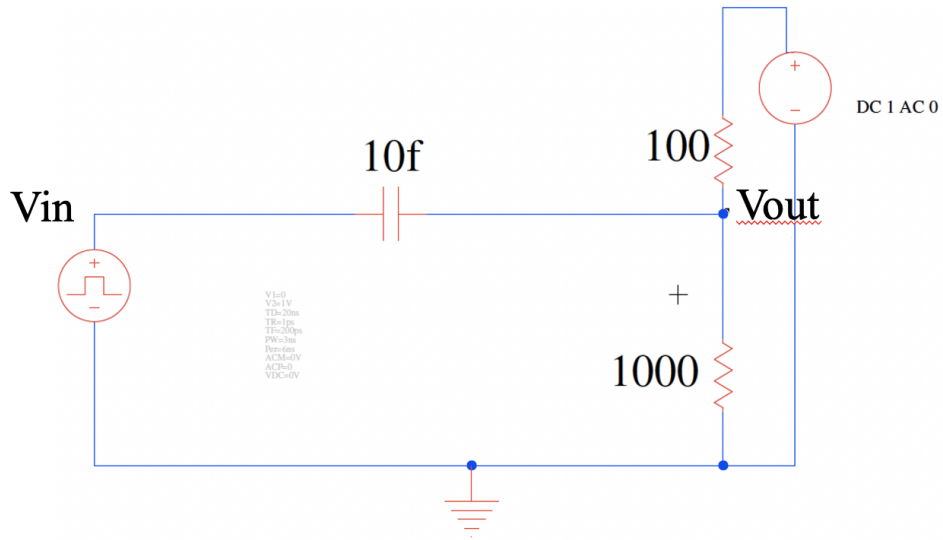


Hint: How many terminal pairs are there?

Terminal Pair	Capacitance

Use in class for notes to summarize cases and capacitances.

3. Assuming a step input from 0 to 1V by the pulse generator on the left, what does the voltage on V_{out} as a function of time look like?



Hints: What is the initial voltage? What is the steady-state voltage as $t \rightarrow \infty$?