Digital Integrated Circuit HW#2

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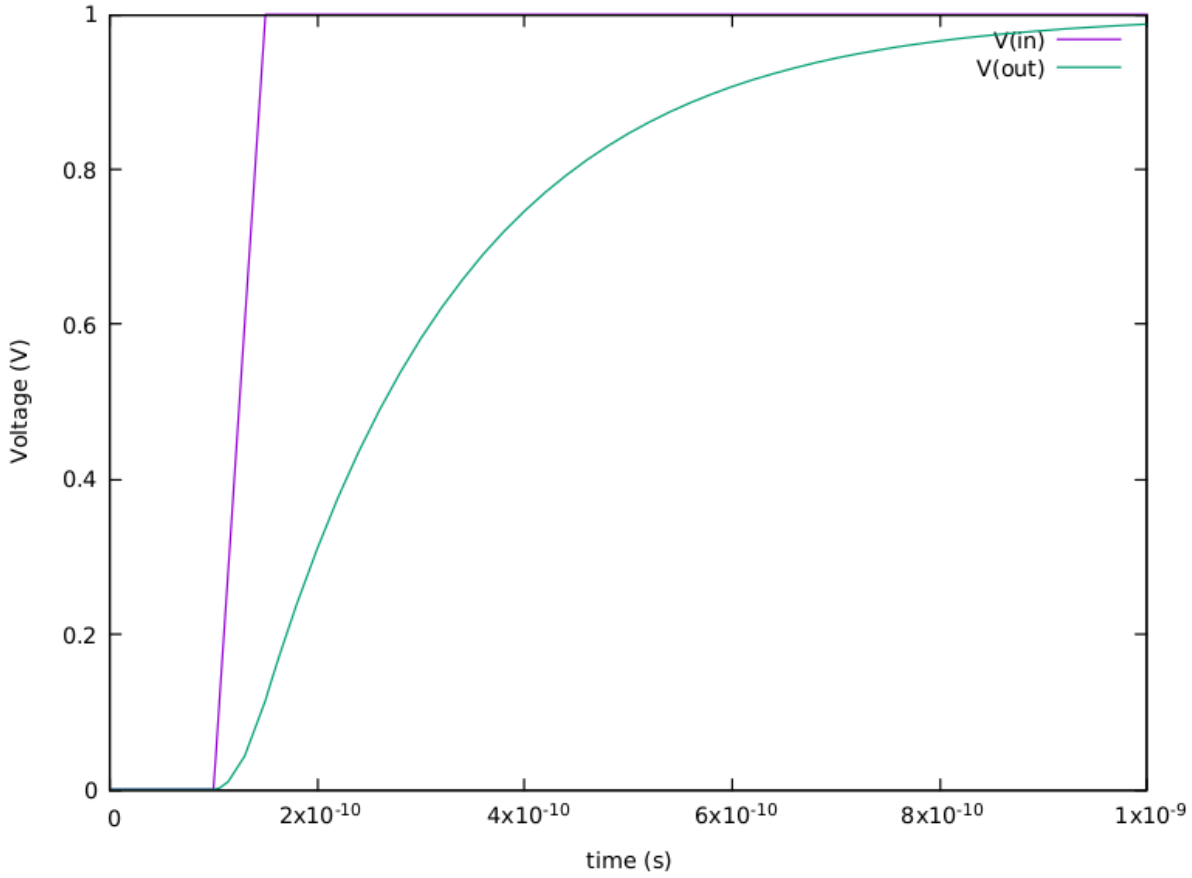
example1)



If input voltage is zero, the output voltage is also zero.

However, if input voltage is 1V, the output voltage increase from zero to 1V.

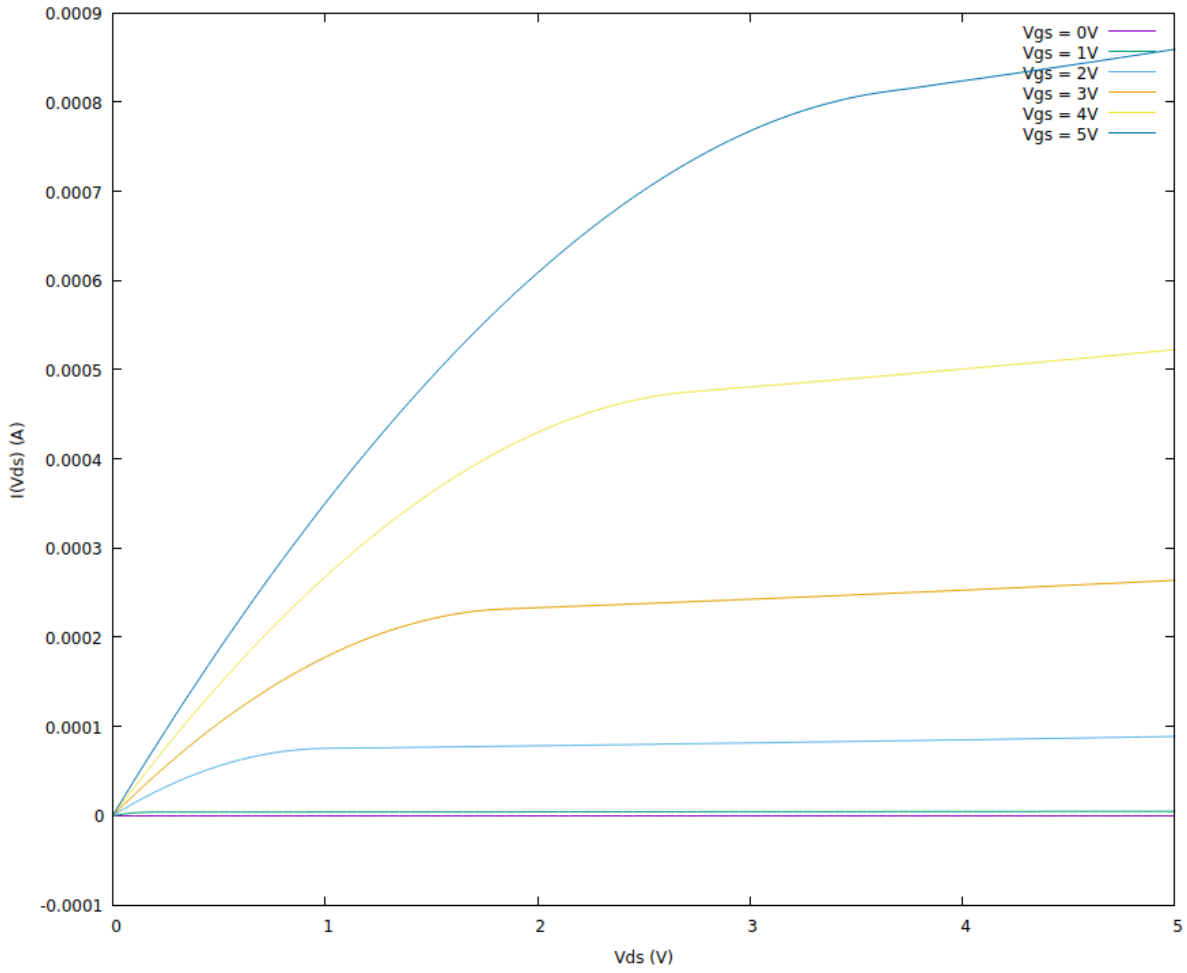
$$\frac{v_{in} - v_{out}}{R_1} = C_1 \frac{dv_{out}}{dt}$$

$$\int \frac{1}{v_{out} - v_{in}} dv_{out} = \frac{-1}{R_1 C_1} dt$$

$$v_{out} = v_{in} + Ae^{-\frac{t}{R_1 C_1}}$$

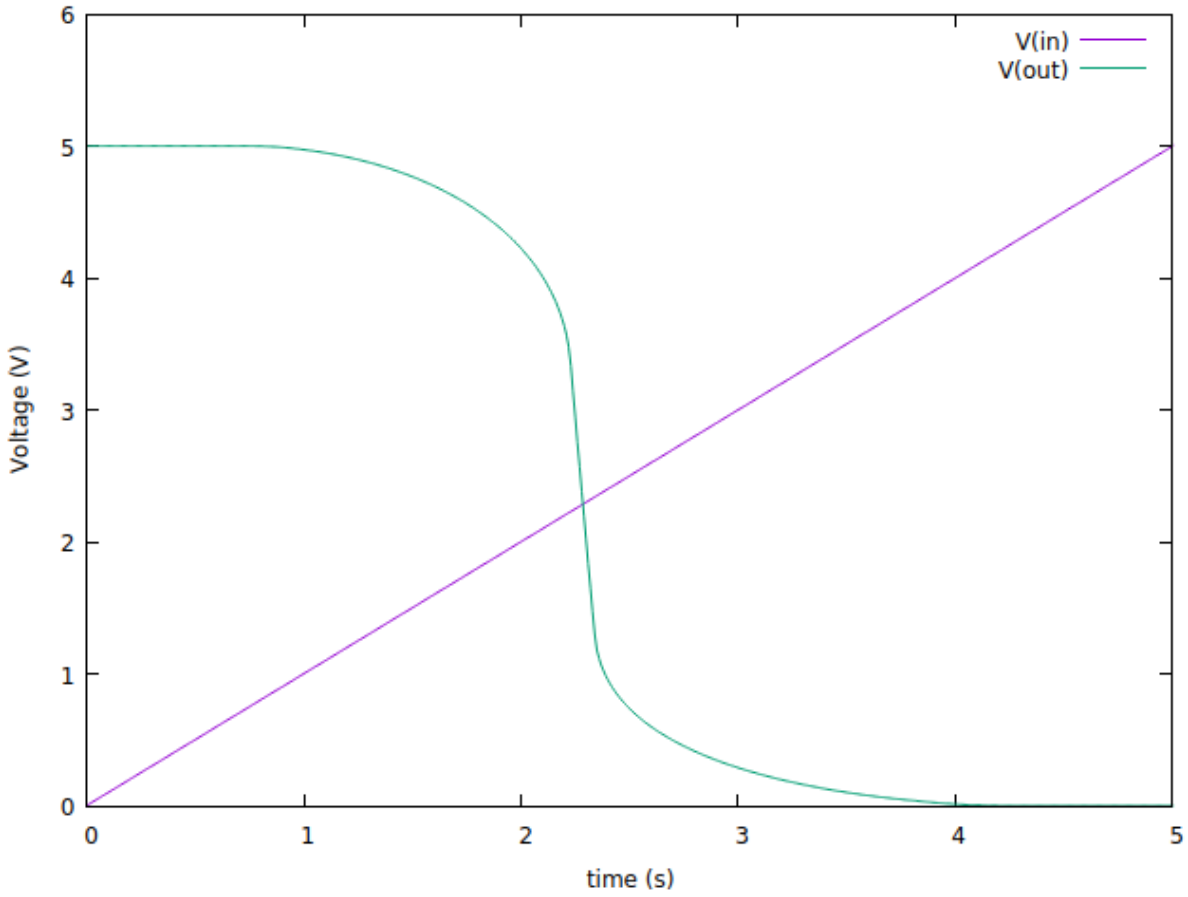
We can think that $\frac{dv_{out}}{dt} = \frac{-A}{R_1 C_1} e^{-\frac{t}{R_1 C_1}} \geq 0$ because the graph shows that the slope of v_{out} is not negative value. Therefore, we can find some statements that if the time goes to infinity, v_{out} would be equal to v_{in}.

example2)



From that graph, we can find that the magnitude of drain current is proportional to gate voltage at the same drain voltage.

example3.



From this graph, we can find that output voltage is inverse to the input voltage.