Homework # 4
Due date: Nov. 17 (Thursday)

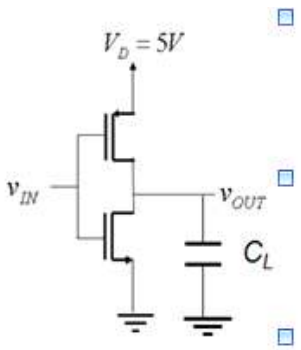
[Textbook]
Exercise 10.11,

Problem 10.1, 10.12

Exercise 11.1,

Problem 11.1 (a)~(d)

[Previous Exam]
Answer the following questions for the CMOS inverter with the following characteristics.
NMOS saturation current:
$i_{Dn} = K_n(V_{GS} - V_{th})^2$, $K_n = 0.1mA/V^2$, $V_{th} = 1.0\,V$
PMOS saturation current:
$i_{Dp} = K_{p.}(V_{S.G.} - |V_{th}|)^2$, $K_p = 0.1mA/V^2$, $V_{th} = -1.0\,V$
$C_L = 100pF$



(a) Find the dynamic power consumption of this inverter when the input is changing with 1 GHz frequency.

(b) Find the input voltage to make both NMOS and PMOS transistors "saturated."
When both transistors are saturated, what would be the range of the output voltage of the inverter? (Hint: find the minimum output voltage to make NMOS saturated. Then find the maximum output voltage to make PMOS saturated (dual of NMOS case).

(c) Using this information, sketch a voltage transfer characteristics of the CMOS inverter.