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HW6

Due Thursday 6/2 at 3:00PM on Gradescope

You are not required to submit the solutions to Part 1, but you still should solve these questions since <u>op amps will be on the final</u>.

Part 1 (Practice Problems):

Q1. Problem 11.3

Q2. Problem 11.22

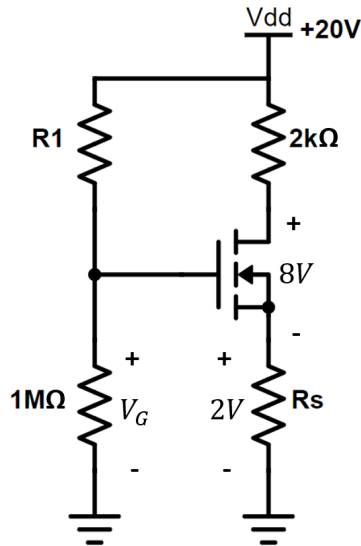**Q3.** Problem 11.50

Q4. Problem 13.9

Q5. Problem 13.12

**Q6**. Problem 13.21

Q7. Problem 13.75

Part 2 (Graded):

Q1. Problem 11.29

The transistor in the figure below has $KP = 50\mu A/V^2$, $W = 600\mu m$, $L = 20\mu m$, and $V_{t0} = 1V$. Determine the values of R_1 and R_s.

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Q2. Problem 11.53

Find V_{DSQ} and I_{DQ} for the FET shown in the figure below, given $V_{t0} = 3V$ and $K = 0.5mA/V^2$. Find the value of g_m at the operating point. Draw the small-signal equivalent circuit, assuming that $r_d = \infty$. Derive an expression for the resistance R_0 in terms of R_D and g_m. Evaluate the expression for the values given.
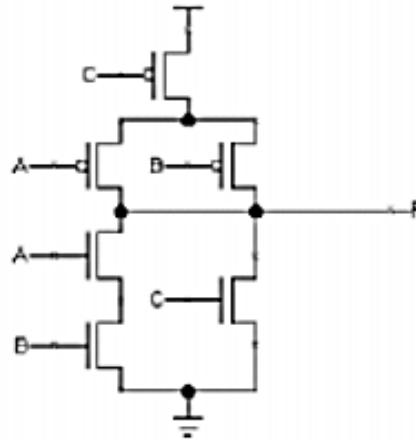

+20V

RD=2.2kΩ

R_0
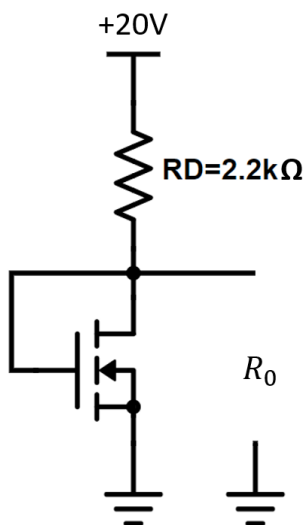
Q3. Problem 11.35

Both transistors shown in the figure below have $KP = 100\mu A/V^2$ and $V_{t0} = 0.5V$. Determine the value of R needed so that $i_{D1} = 0.2mA$. For what range of V_x is the second transistor operating in the saturation region? What is the resulting value of i_{D2}? Provided that V_x is large enough so that the second transistor operates in saturation, to what ideal circuit element is the transistor equivalent?
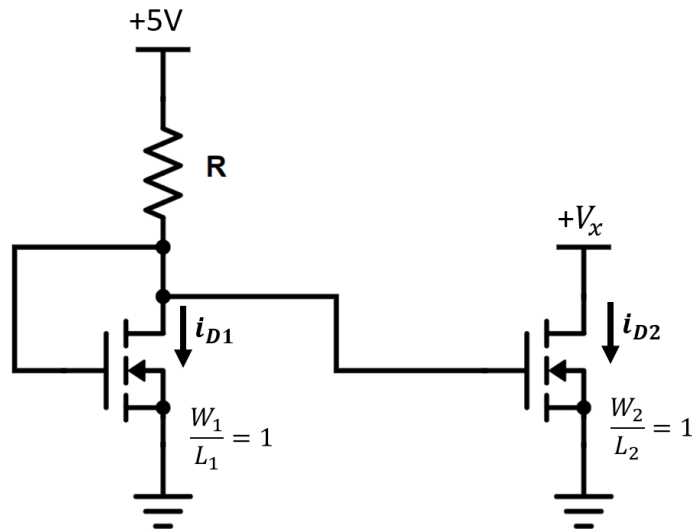
Q4. Analyze the CMOS circuit below (triode region equivalent) and fill out the "truth table" for it.

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0