

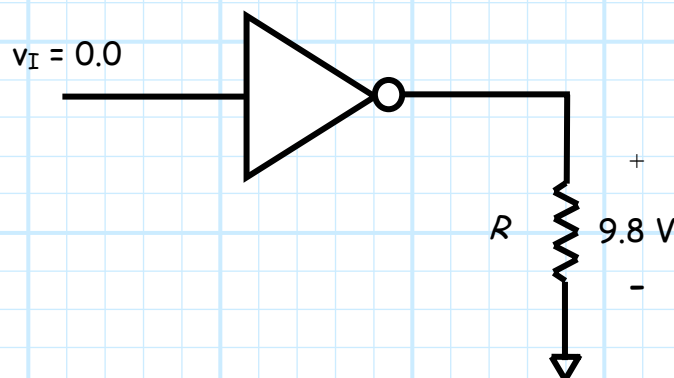
### Special Problem 4.10-3

For **all three** questions below, use these values:

A CMOS inverter uses FETs with  $K = 1.0 \text{ mA/V}^2$  and  $V_T = 3.0 \text{ V}$ .

The inverter also has  $V_{DD} = 10 \text{ V}$

- 1) What is the **smallest** value of  $V_I$  that will produce an acceptably low voltage at the inverter **output** (i.e., an output voltage that will be evaluated as a **logic 0**) ?
- 2) If  $V_I = 5.0 \text{ V}$ , what is the **drain current** of the NMOS transistor?
- 3) Say  $V_I = 0.0$ , and the output of the inverter is connected to a resistor to ground:



The voltage across this resistor is **9.8 V**. Determine the **approximate** value (using any valid simplifying approximation) of this **resistor**.