GIVEN: FIG. P7.5 CMOS INVERTER

$V_{DD} = 2.5V$ $V_{SS} = 0V$ & AGAIN $V_{DD} = 1.8V$

FIND: V_L & V_H

SOLN:

A) FOR $V_{DD} = 2.5$ $V_{SS} = 0$

$V_L = V_{SS} = 0V$

$V_H = V_{DD} = 2.5V$

B) $V_L = 0V$

$V_H = 1.8V$

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GIVEN: CMOS INVERTER OF FIG. P7.5

$\left(\frac{W}{L}\right)_N = \frac{20}{1}$ $\left(\frac{W}{L}\right)_P = \frac{50}{1}$

$V_{DD} = 0V$ $-V_{SS} = -5.2V$

FIND: A) V_L & V_H

B) V_L & V_H IF BOTH $\frac{W}{L} = \frac{10}{1}$

SOLN: A) $V_L = -V_{SS} = -5.2V$

$V_H = V_{DD} = 0V$

B) $V_L = -5.2V$ $V_H = 0V$

THESE VALUES DO <u>NOT</u> DEPEND UPON $\frac{W}{L}$ RATIOS!

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GIVEN: CMOS INVERTER

$\frac{W}{L} = \frac{2}{1}$ $V_{DD} = 2.5V$

$V_{t0} = 0.6$ & -0.6 V

FIND: NOISE MARGINS

SOLN: USE EQNS. 7.11 -> V_{IL} 7.7 -> V_{IH}

7.8 -> V_{OL} 7.12 -> V_{OH}

$$K_R = \frac{K_N}{K_P} = \frac{100}{40} = 2.5$$

AND... $V_{IL} = 0.902$ V $V_{IH} = 1.22$ V

$V_{OL} = 0.174$ V $V_{OH} = 2.38$ V

AND $NM_H = V_{OH} - V_{IH} = 1.16$ V

$NM_L = V_{IL} - V_{OL} = 0.728$ V

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