

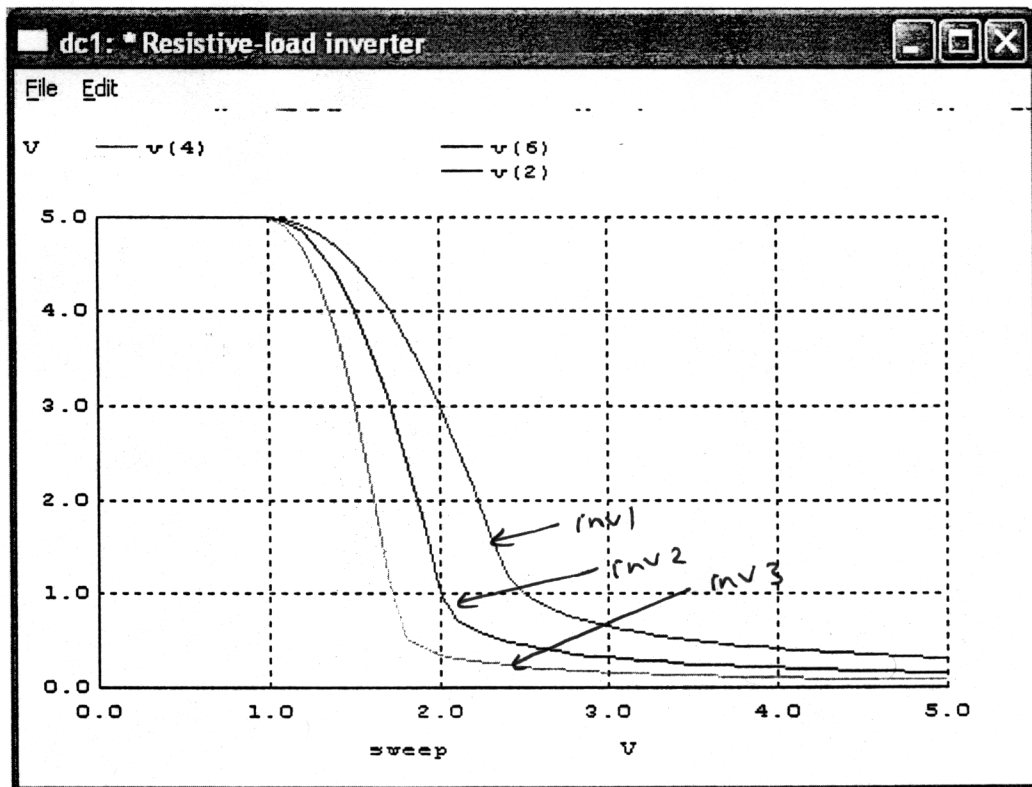
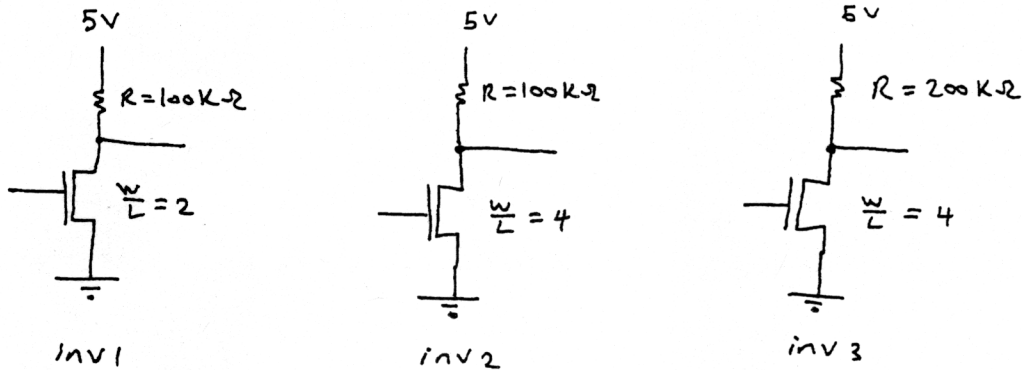
Name: Key

Id#

COE 360, Principles of VLSI Design, Term 032  
Quiz# 7

Date: Tuesday, May 4

Q1. Given the following three resistive-load inverters and the three voltage transfer characteristic graphs for the three inverters, select the voltage-transfer characteristic graph that corresponds to each inverter. Show your answer in the given graph. Justify your answer.



$$V_{OL} = \frac{R_d}{R_d + R_L} V_{DD}$$

$\underline{\text{inv1}}$  :  $V_{OL} \approx \frac{\frac{1}{2} V_{DD}}{\frac{1}{2} + 100k} = \frac{\frac{1}{4} V_{DD}}{\frac{1}{4} + 50k}$   
 $\underline{\text{inv2}}$  :  $V_{OL} \approx \frac{\frac{1}{4} V_{DD}}{\frac{1}{4} + 100k}$   
 $\underline{\text{inv3}}$  :  $V_{OL} \approx \frac{\frac{1}{4} V_{DD}}{\frac{1}{4} + 200k}$

$\Rightarrow V_{OL}(\text{inv3}) < V_{OL}(\text{inv2}) < V_{OL}(\text{inv1})$