

Name: \_\_\_\_\_ (please print)

Signature: \_\_\_\_\_

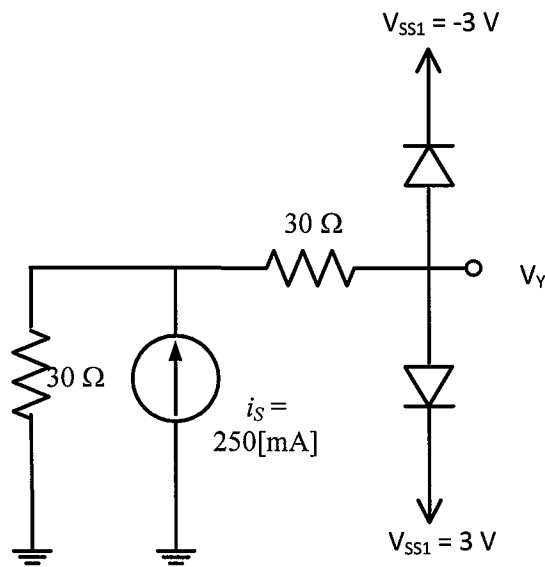
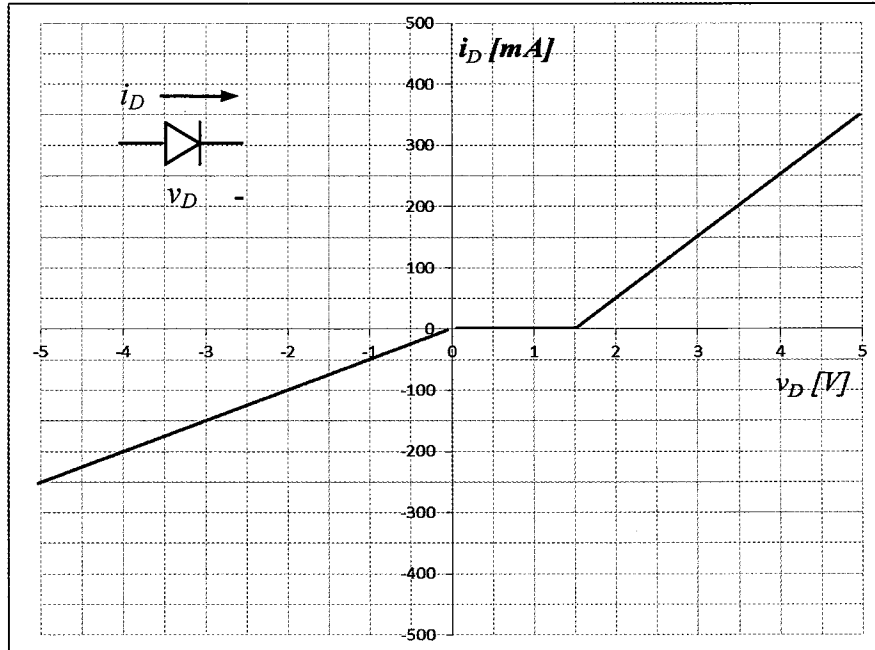
ECE 3355  
Quiz #4  
July 12, 2017

1. You may have an 8 ½ x 11” crib sheet, but no other materials, and no communication devices of any kind.
2. Show all work necessary to complete the problem on these pages. If you go on to another page, indicate clearly where your work can be found. A solution without the work shown will receive no credit.
3. Show all units in expressions and figures.
4. Do not use red ink.
5. You will have 25 minutes to work on this quiz.

\_\_\_\_\_ /25

Room for extra work

The graph below shows the current-voltage characteristics for an LT3355 diode. The current and voltage polarities are shown in the drawing. Find the voltage  $v_Y$  in the circuit below.



Room for extra work

Name: \_\_\_\_\_ (please print)

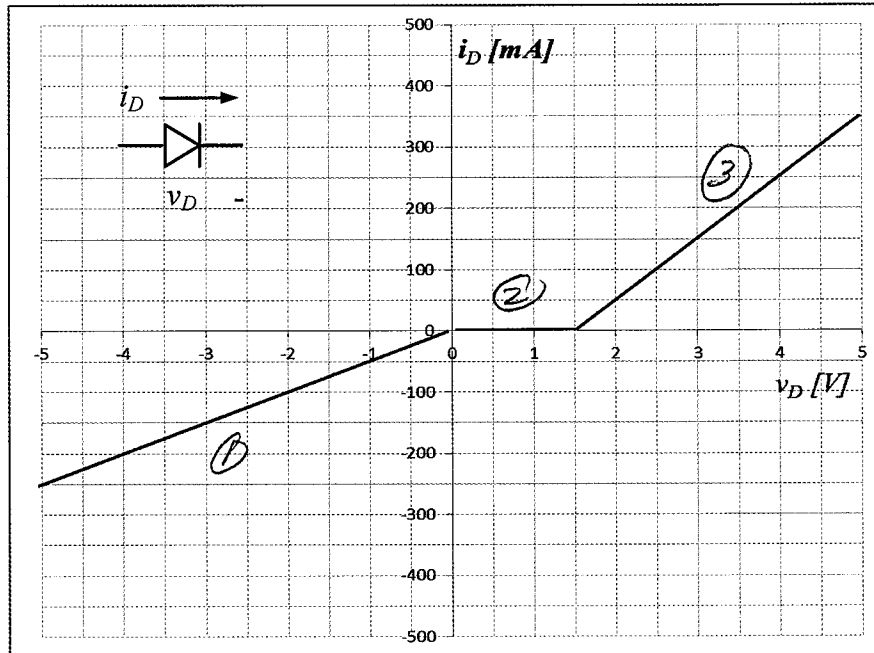
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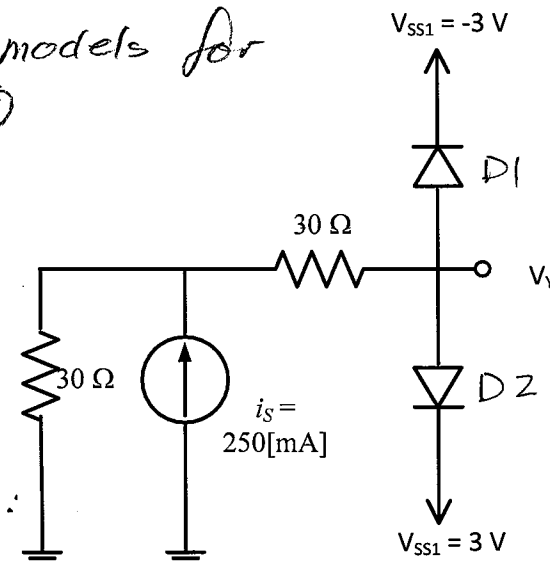
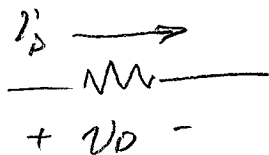
The graph below shows the current-voltage characteristics for an LT3355 diode. The current and voltage polarities are shown in the drawing. Find the voltage  $v_Y$  in the circuit below.



Let's find circuit models for regions 1 and 3

①  $\frac{\Delta i_D}{\Delta v_D} = \frac{0.250}{5} = \frac{1}{r_D}$   
 $r_D \Rightarrow 20 \Omega$

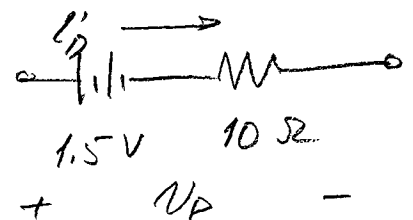
So the model here is:



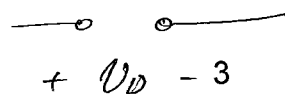
③  $\frac{\Delta i_D}{\Delta v_D} = \frac{0.350}{3.5} = \frac{1}{r_D}$

$r_D = 10 \Omega$

So we have

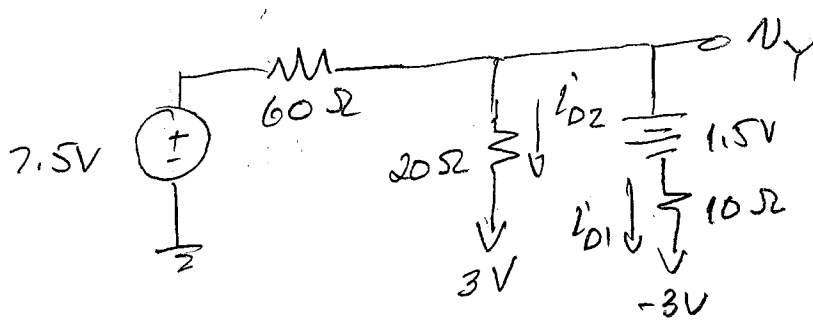
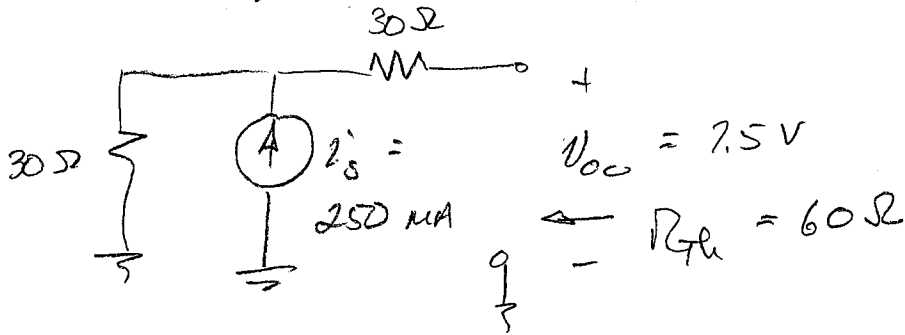


Region 1 is  $i_D = 0$ :



Room for extra work

Although not completely necessary, we can find a Thevenin equivalent of the current source and resistors:



we have guessed region 3 for D1 and region 1 for D2.

Test:  $i_{D2} < 0$ ?  
 $i_{D1} > 0$ ?

$$\frac{V_Y + 3 - 1.5}{10} + \frac{V_Y - 3}{20} + \frac{V_Y - 7.5}{60} = 0$$

$$\Rightarrow V_Y = 0.75 \text{ V}$$

$$i_{D1} = \frac{0.75 + 3 - 1.5}{10} = 225 \mu\text{A} \quad \checkmark$$

$$i_{D2} = \frac{0.75 - 3}{20} = -112.5 \mu\text{A} \quad \checkmark$$

So our guesses were good and  $V_Y = 0.75 \text{ V}$

Room for extra work