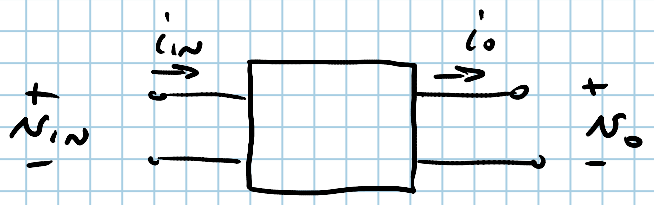
QUIZ #1 REVIEW

Thursday, June 11, 2015
5:00 PM



$A_v = -10$

$A_p = 60$

$i_{in} = -1\ A$

$$A_p = A_v A_i \Rightarrow A_i = \frac{A_p}{A_v} \overset{(a)}{=} \frac{60}{-10} = \boxed{-6 = A_i}$$

b) Find i_o:

$$A_i = \frac{i_o}{i_{in}} \Rightarrow i_o = i_{in} A_i$$

$$i_o = (+1A)(-6)$$

$$\boxed{i_o = +6\ A}$$

DIODES

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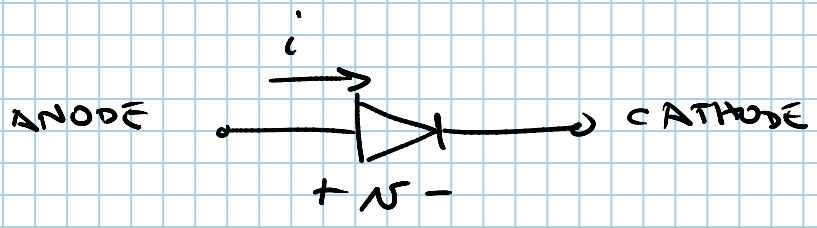
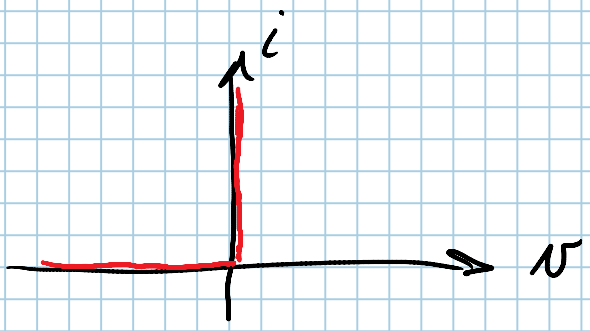
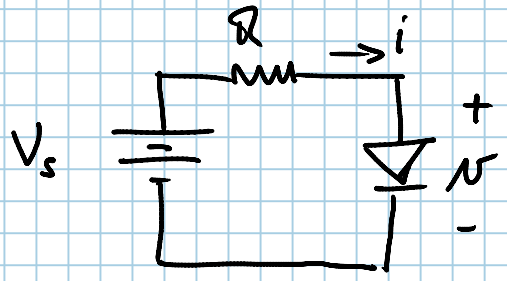
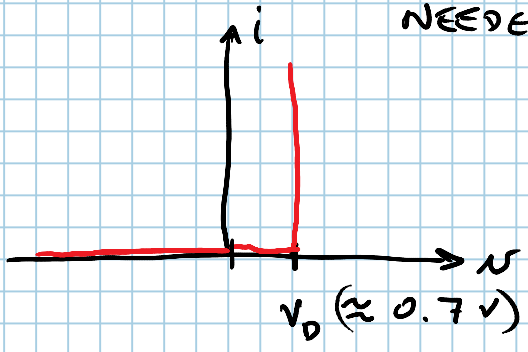


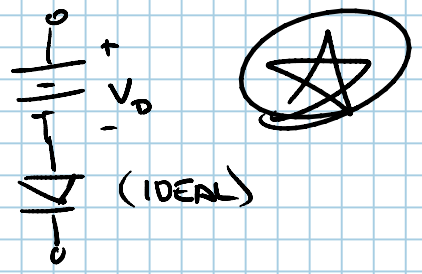
THE IDEAL DIODE





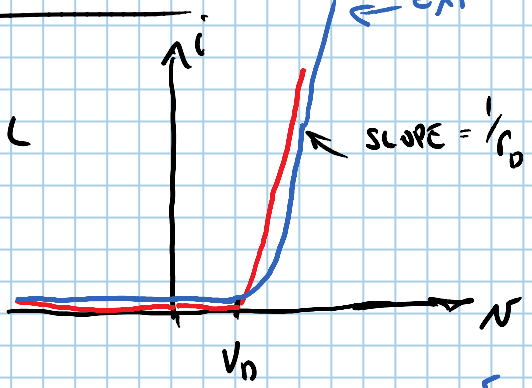
1ST APPROXIMATION : SOME NON-ZERO DIODE VOLTAGE (v) IS NEEDED FOR CONDUCTION.

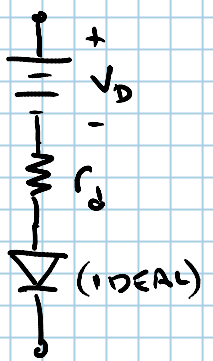




2ND APPROXIMATION

PIECE-WISE LINEAR MODEL





FOR THE EXP. MODEL: $i = I_S e^{\frac{v}{nV_T}}$

$(I_S, n, V_T) \equiv$ DEVICE PARAMETERS.

EXAMPLE

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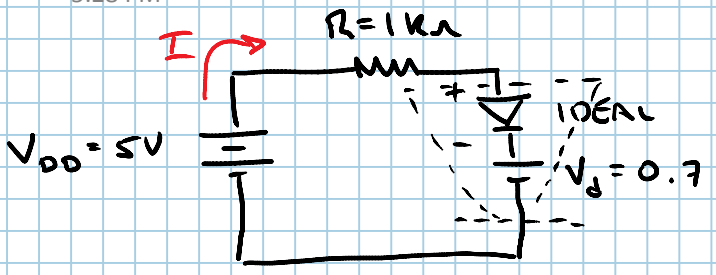


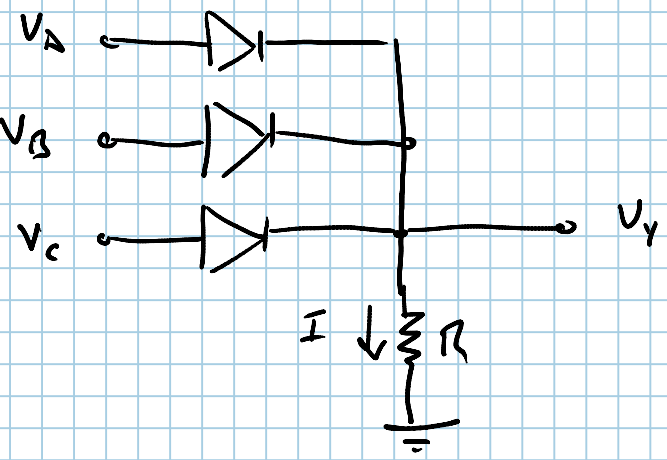
KVL:

$$(1k\Omega)I + 0 + V_d = 5V \quad (V_d = 0.7V)$$

$$1I + 0.7 = 5$$

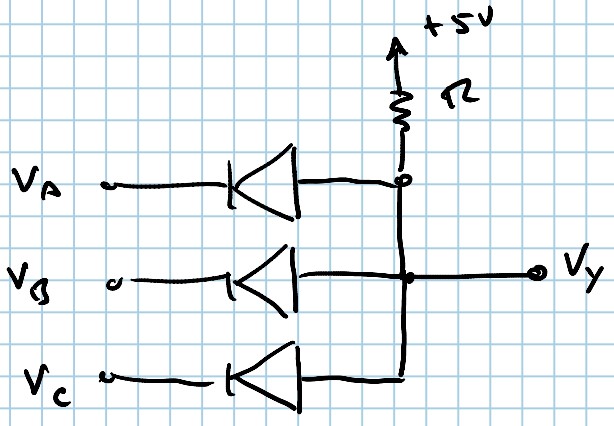
$$\boxed{I = 4.3\ mA}$$

GOING BACK IDEAL DIODES....



V_A	V_B	V_C	V_y
0	0	0	0
→ 0	0	5	5
0	5	0	5
0	5	5	5
5	0	0	5
5	0	5	5
5	5	0	5
5	5	5	5

OR FUNCTION



V_A	V_B	V_C	V_y
0	0	0	0
0	0	5	0
0	5	0	0
0	5	5	0
5	0	0	0
5	0	5	0
5	5	0	0
5	5	5	5

AND FUNCTION

EXAMPLE

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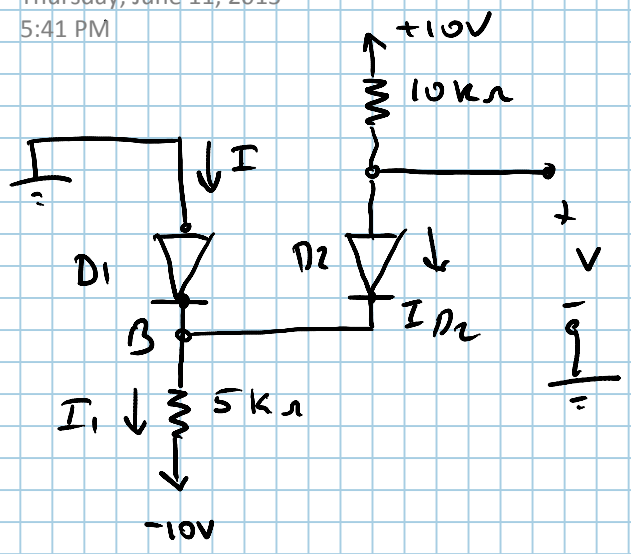


FIND V & I (IDEAL DIODES)

ASSUME D_1 & D_2 CONDUCTING

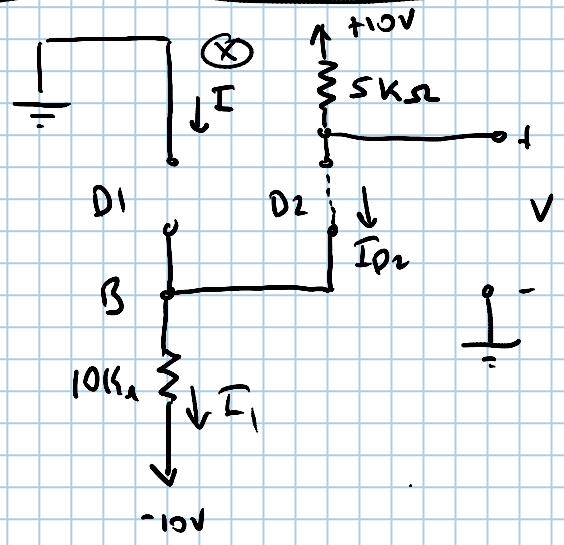
$V_B = 0V$, $V = 0V$

$I_1 = I + I_{D2} \Rightarrow I = I_1 - I_{D2}$

$I_1 = \frac{0 - (-10V)}{5k\Omega} = 2mA$

$I_{D2} = \frac{+10V - 0V}{10k\Omega} = 1mA$

$I = 2 - 1 = \boxed{1mA}$



FIND I, V

ASSUME D_1 & D_2 CONDUCTING

$V_B = 0V$, $\underline{V = 0V}$

$I_1 = \frac{0 - (-10)}{10k\Omega} = 1mA$

$I_{D2} = \frac{10 - 0}{5k\Omega} = 2mA$

$I = I_1 - I_{D2} = 1mA - 2mA = -1mA = I$

A FWD. BIASED DIODE CANNOT CONDUCT NEG CURRENT!!!

ASSUME D_1 IS "OFF" (REV. BIASED)
D_2 IS "ON" (FWD-BIASED)

$\boxed{I = 0}$,

$I_{D_2} = I_1 = \frac{10 - (-10)}{(5+10)k\Omega}$

$= \frac{20V}{15k\Omega} = +1.33\ mA = I_{D_2}$

$V = V_B = (10k\Omega)(.33\ mA) - 10$

$V_B = \boxed{-3.3V = V}$