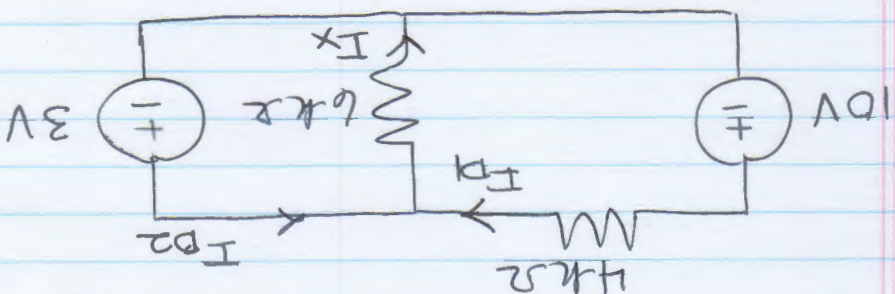


# Problem Set #5 - Solutions

① Assume both diodes on



$I_{D1}, I_{D2} > 0$   
if both diodes  
are on.

$$I_{D1} = \frac{10 - 3}{4k} = 1.75 \text{ mA}$$

by KCL

$$I_{D1} + I_{D2} = I_X$$

$$1.75 + I_{D2} = 0.5$$

$$I_X = \frac{6}{3} = 0.5 \text{ mA}$$

$$I_{D2} = -1.25 \text{ mA}$$

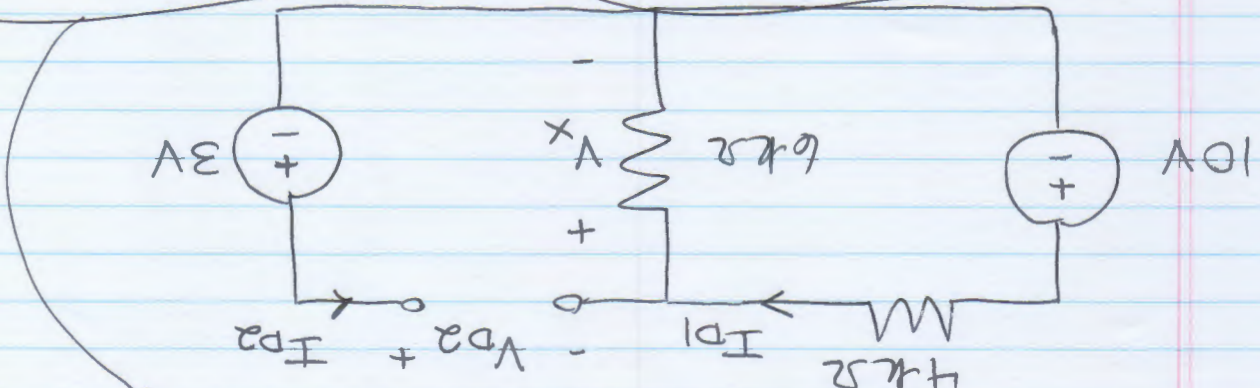
can't be  
true if

diode 2 is on

Assume  $D1$  on  $D2$  off } we expect

$$I_{D1} > 0$$

$$V_{D2} < 0$$



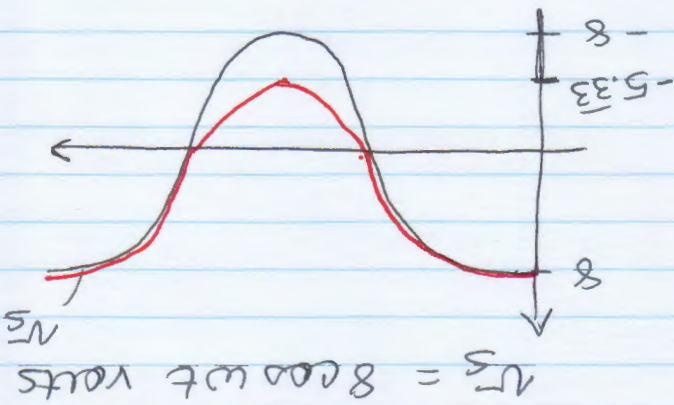
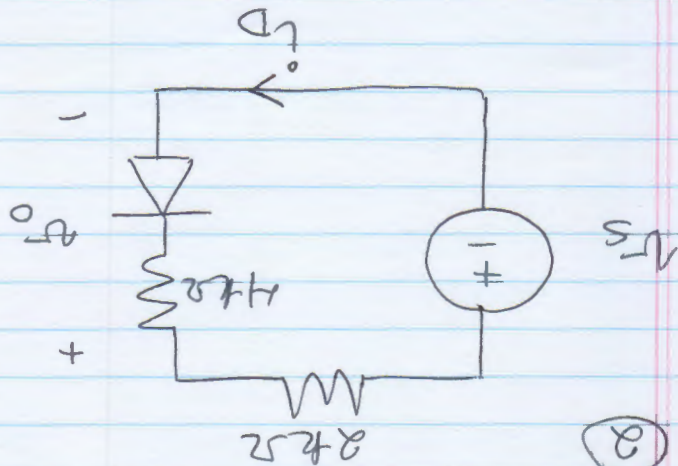
$$V_X = I_{D1}(6k) = 6V$$

$$I_{D1} = \frac{10}{10k} = 1 \text{ mA}$$

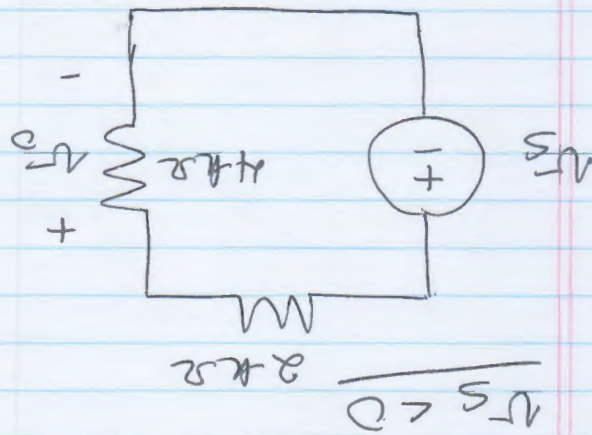
correct

$$V_{D2} = 3 - 6 = -3V$$

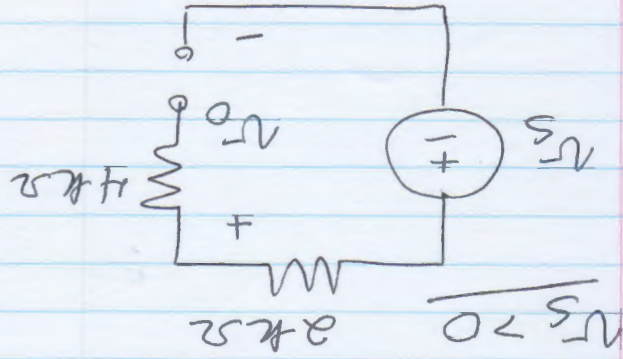
(2)



if  $V_S > 0$  then  $I_D < 0$ , diode is off  
if  $V_S < 0$  then  $I_D > 0$ , diode is on



$$V_O = \frac{4}{4+2} V_S = \frac{2}{3} V_S$$

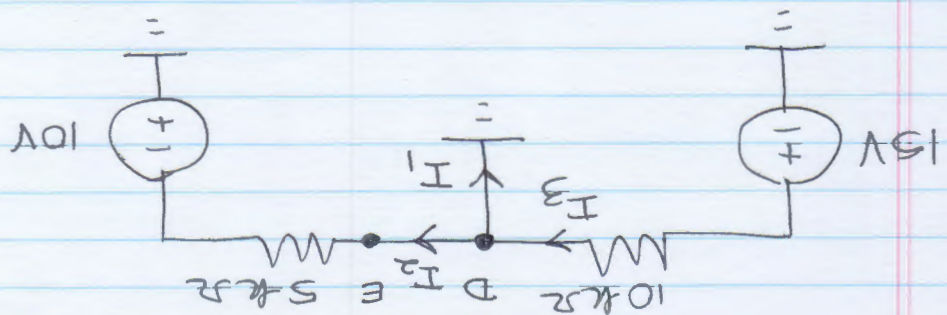


$$V_O = \frac{1}{3} V_S$$



# PS #5 - Solutions pg 3

③ Assume diodes are both on:



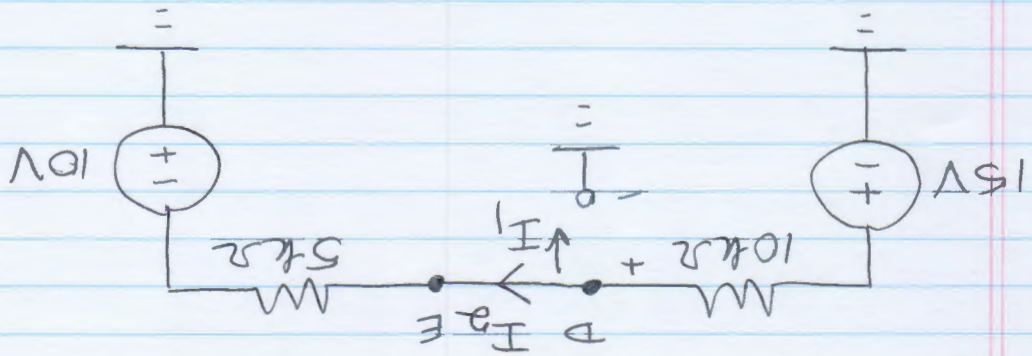
$$I_2 = \frac{10}{5k} = 2mA$$

$$I_3 = \frac{15}{10k} = 1.5mA$$

$$I_1 = I_3 - I_2 = 1.5 - 2.0 = -0.5mA \quad I_1 > 0 \text{ if}$$

Diode 1 is on.

Assume D1 OFF, D2 ON



$$I_2 = \frac{15}{25k} = 1.67mA \quad I_1 = 0$$

at D4 E  $\Rightarrow$  voltage is  $-1.67V$