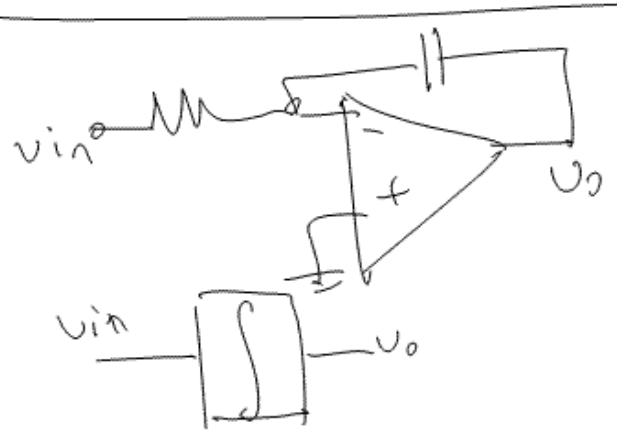
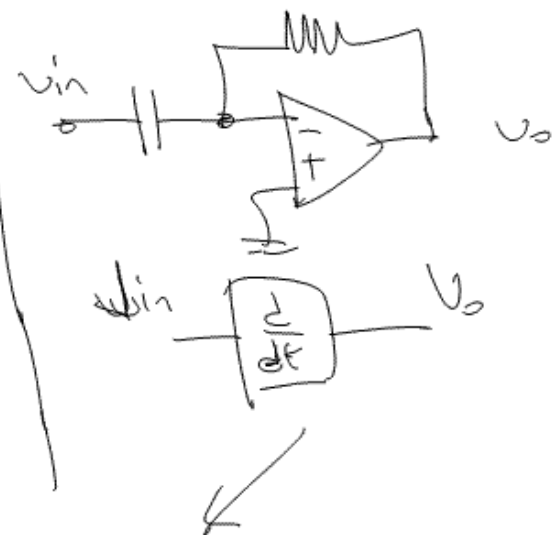
EE100 Wednesday August 10th 2025 office hours

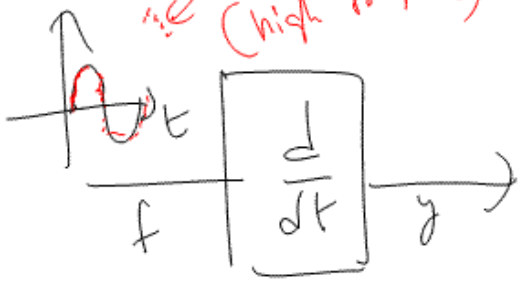
Final → No THEVENIN/NORTON! → No LOAD LINE!
→ No AC analysis!

(Q:) Op-amp integrators / differentiators (maybe on the test)





Differentiators are hard to build in reality.

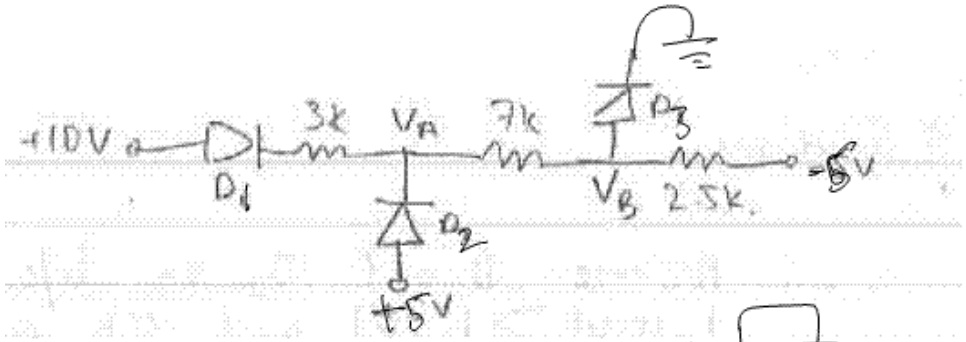


$$f(t) = \sin(\omega t) + \underbrace{A_{noise}}_{\text{small in V}} \sin(\underbrace{\omega_{noise}}_{\text{HUGE } (\simeq \text{MHz})} t) \xrightarrow{\frac{d}{dt}} y = \frac{d}{dt} f$$

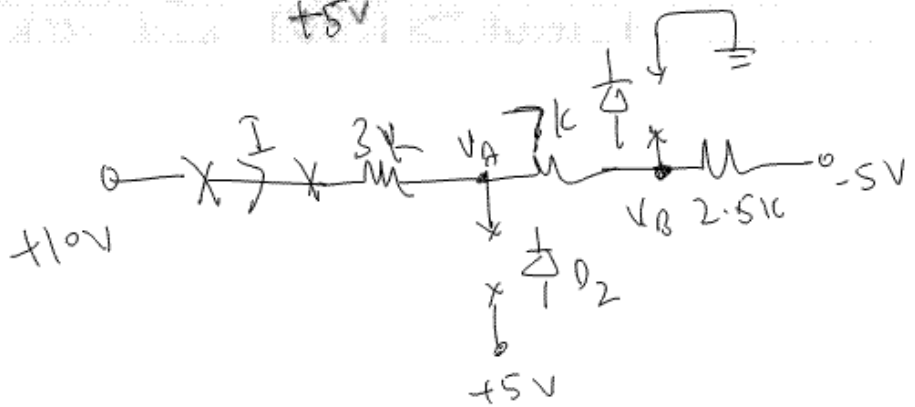
Big!

$$= \omega \sin(\omega t) + A_{noise}\,\omega_{noise} \cos(\omega_{noise} t)$$

(Q.) Prob 3 from Sp05 H.W #10 [all diodes are ideal]



Assume D_1 on, D_2 off, D_3 off.



$$I = \frac{10-(-5)}{12.5\,k}$$

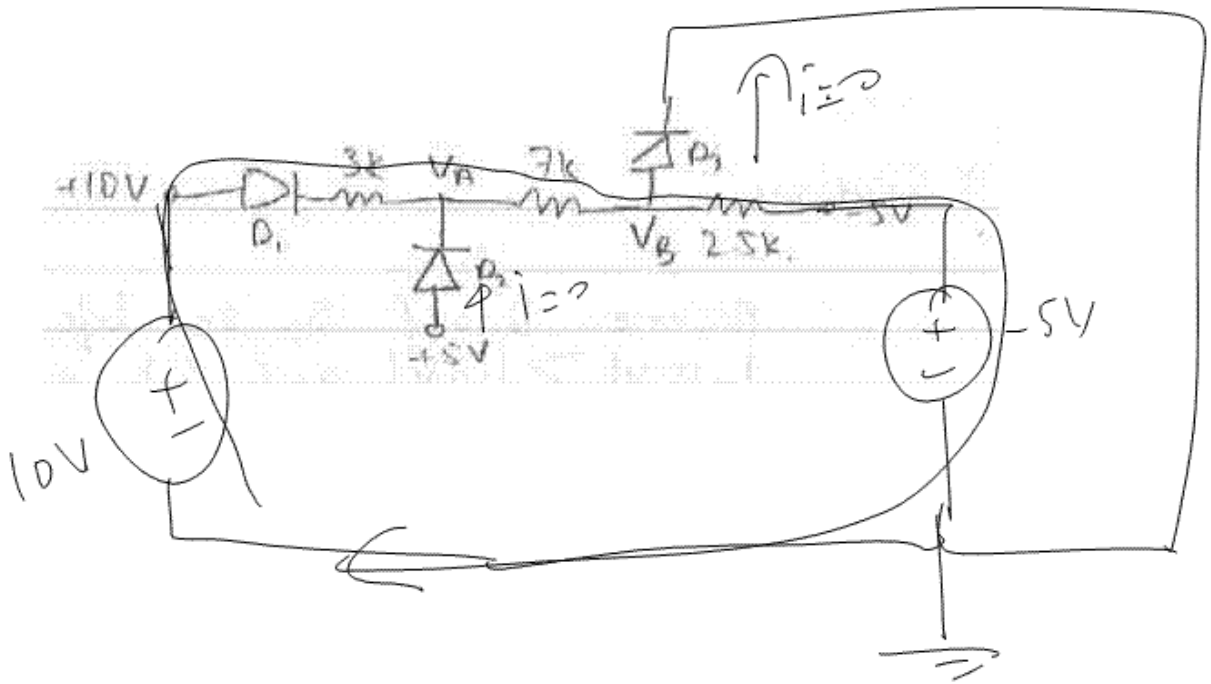
$$= \frac{15}{12.5k} = 1.2\,mA$$

$$\therefore V_A = 10-(3k)(1.2\,mA) = 10-4.6 = 6.4V$$

D_2 off

$$V_B = V_A-(7k)(1.2\,mA) = -2\,V$$

D_3 off



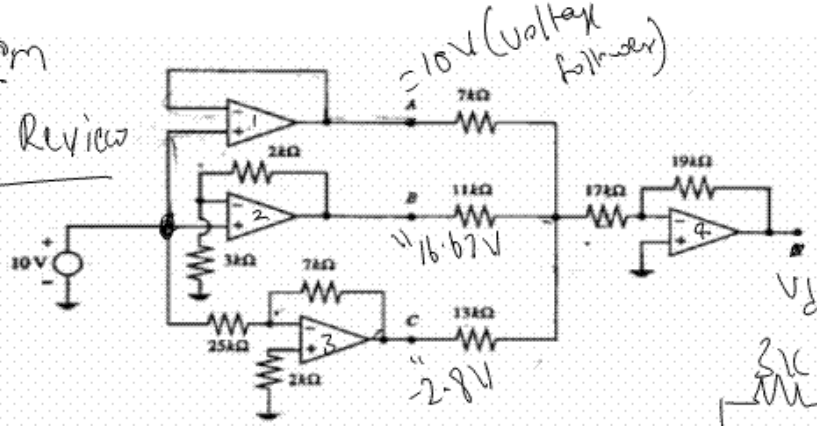
(Q:) How do you find D & S in an FET?

(A:) (i) I will give you only Nmos ⇒ source is towards lower potential in a circuit.

(ii) source is always tied to body:

(or)

(Q:) Prob 1 from SpOS MT II Review



In the above circuit all the op-amps are "ideal".

a) Find Va (the voltage at node A with respect to ground):

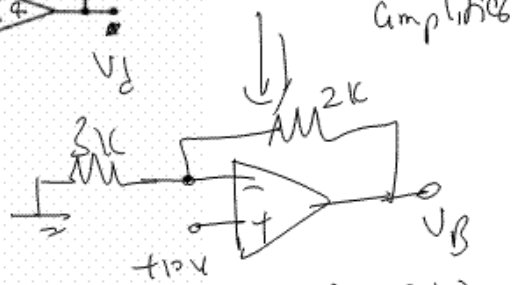
b) Find Vb:

c) Find Vc:

d) Find Vd:

(12) Voltage follower

(2) → noninverting amplifier

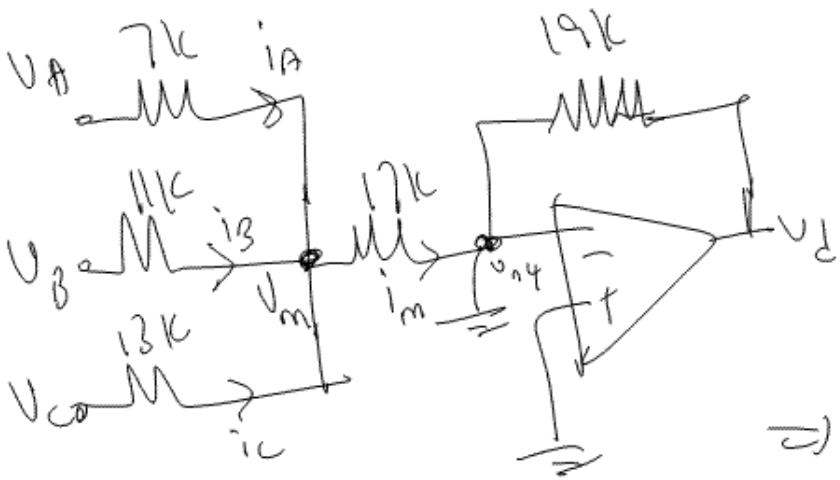


$V_B = \left(1 + \frac{2K}{3K}\right) 10V$

$\approx 16.67\,V$

(3) → inverting amplifier. $V_C = 10\left(\frac{-7k}{25k}\right) = -2.8\,V$

Now (4) → looks like an inverting summing amplifier; little different. So, let's derive V_d:



$$i_m = \frac{V_m}{17k}$$

$$\Rightarrow i_A + i_B + i_C = \frac{V_m}{17k}$$

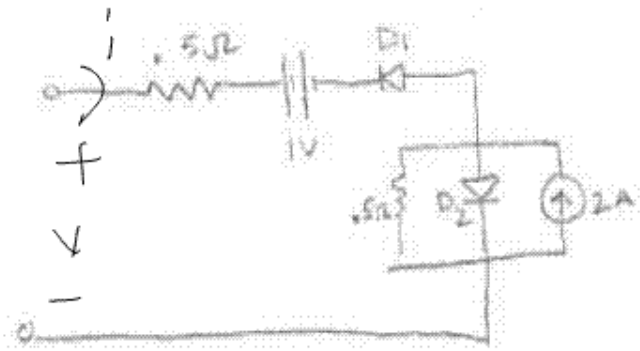
$$\Rightarrow \left(\frac{V_A - V_m}{7k}\right) + \left(\frac{V_B - V_m}{11k}\right) + \left(\frac{V_C - V_m}{13k}\right) = \frac{V_m}{17k}$$

$$\Rightarrow V_n = 7.4\,V$$

$$\therefore \text{KCL @ } V_{n4}: \quad i_m = \frac{0 - V_d}{19k}$$

$$\Rightarrow \frac{7.4}{12k} = \frac{-V_d}{19k} \Rightarrow \boxed{V_d = -8.3\,V}$$

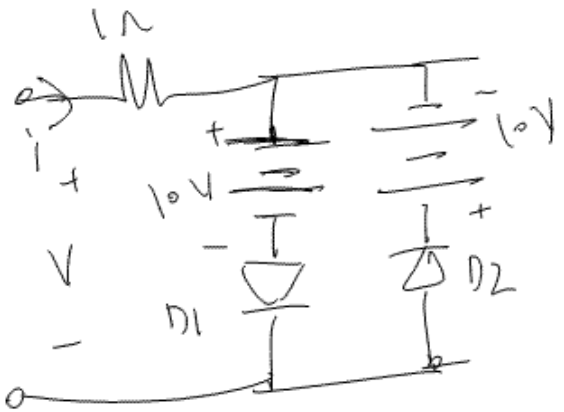
(Q:) Prob 3 (d) from Spo5 HW #11

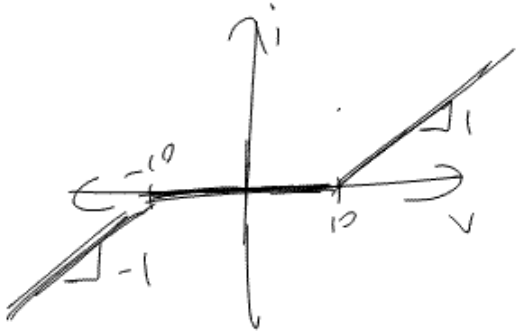


(Q:) Assuming all diodes are ideal, sketch i vs v.

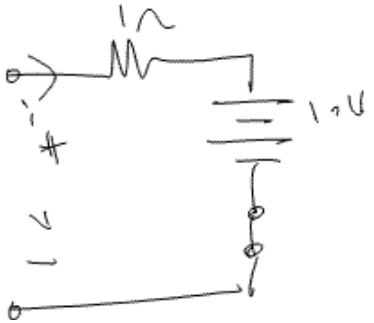
Problem Too HARD for the find, ignore.

Ex:



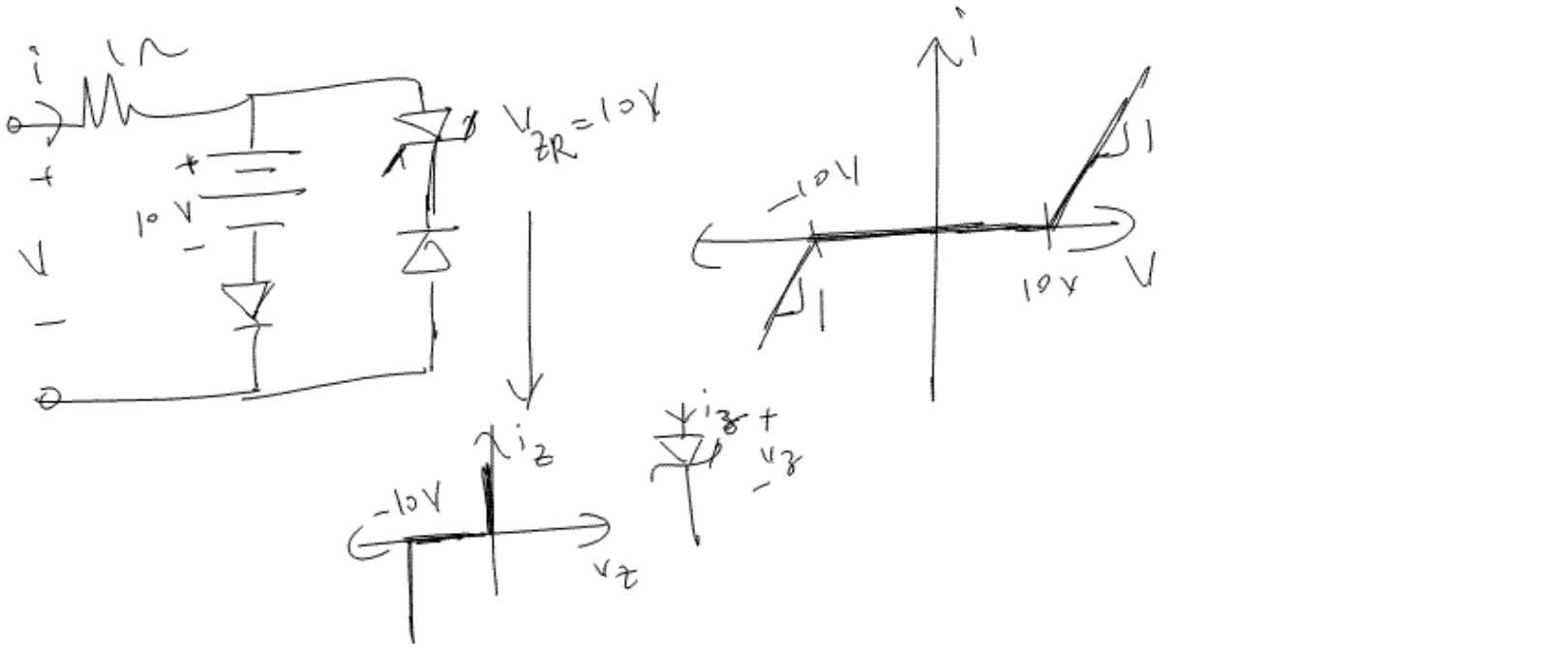


If D1 is on:



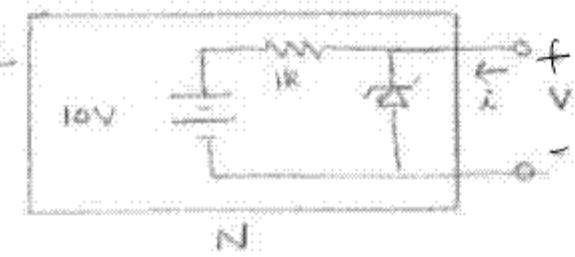
$i = \frac{V-10}{1}$

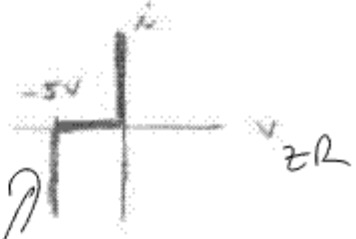
Ex: If one of the batteries above is a zener diode:



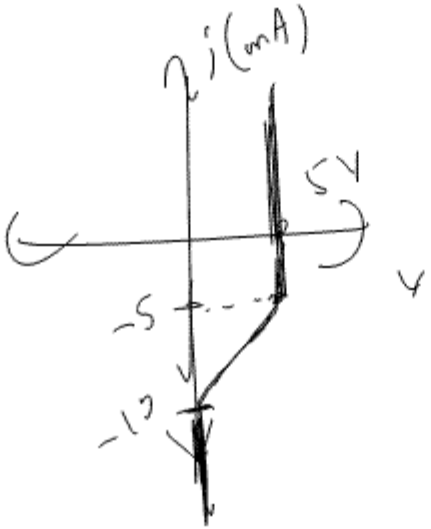
(Q.1) Tom Hiwill Sp 05

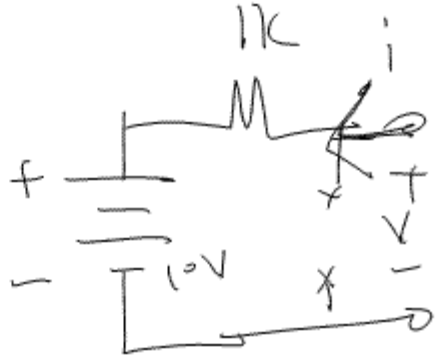
Problem 1





$V_{ZR} = -5V$





$(0 \leq V \leq 5V)$

KVL: $+10 - V + (1K)\, i = 0$

$\Rightarrow \quad i = \dfrac{V - 10}{1K}$