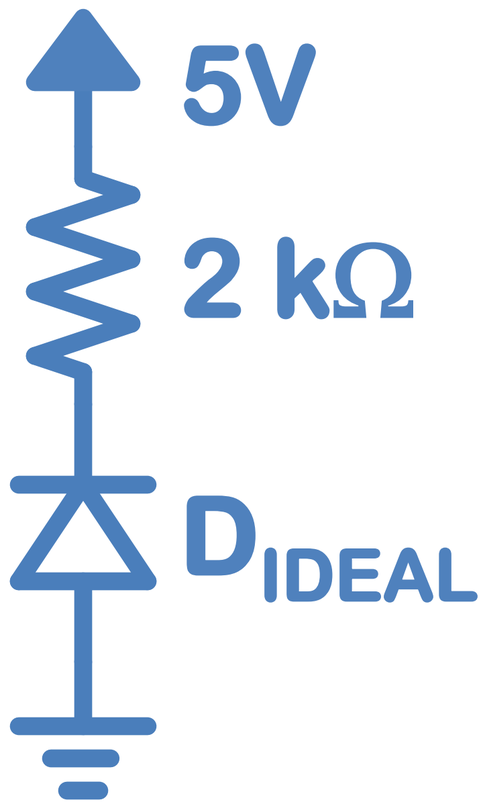
Problem 1.

Find V_D and I_D for each circuit.

(A)

1. FB:
2. short (vD=0)
3. iD = 4/3.8k
 iD = 1.05mA
4. check iD>0
YES
5. Done



(B)

1. RB:
2. open (iD=0)
3. vD = 0-5 = -5V
4. check vD<0
YES
5. Done

(C)

1. RB:
2. open (iD=0)
3. vD = -1-0 = -1V
4. check vD<0
YES
5. Done

(D)

1. FB:
2. short (vD=0)
3. iD = 0- -3/7k
 iD = 0.43mA
4. check iD>0
YES
5. Done

Problem 1.
Find V_D and I_D for each circuit.

(E)

1. FB:
2. short (vD=0)
3. iD = 0- -8/12k
   iD = 0.67mA
4. check iD>0

YES

5. Done

(F)

1. FB:
2. short (vD=0)
3. iD = 4-0/2.3k
   iD = 1.74mA
4. check iD>0

YES

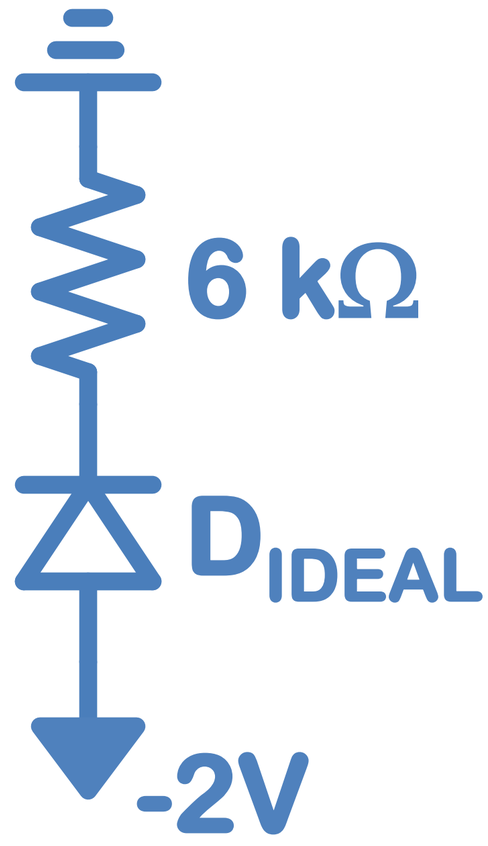
5. Done

(G)

1. FB:
2. short (vD=0)
3. iD = 0- -5/11k
   iD = 0.45mA
4. check iD>0

YES

5. Done



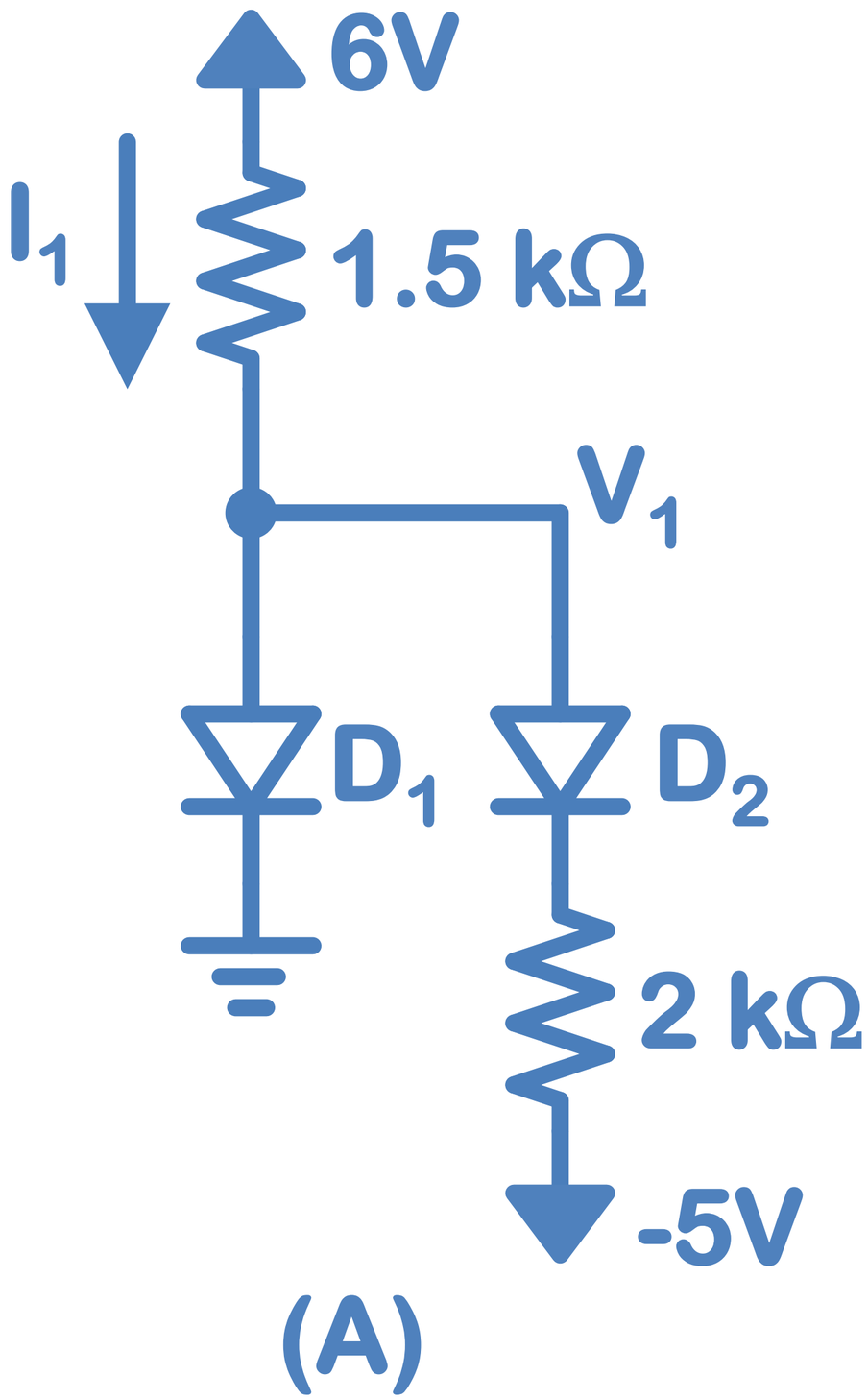
(H)

1. RB:
2. open (iD=0)
3. vD = -2-0 = -2V
4. check vD<0

YES

5. Done

Problem 2. Find $V_{1,2,3}$ and $I_{1,2,3}$ in the circuits below. All diodes are ideal.



(A)

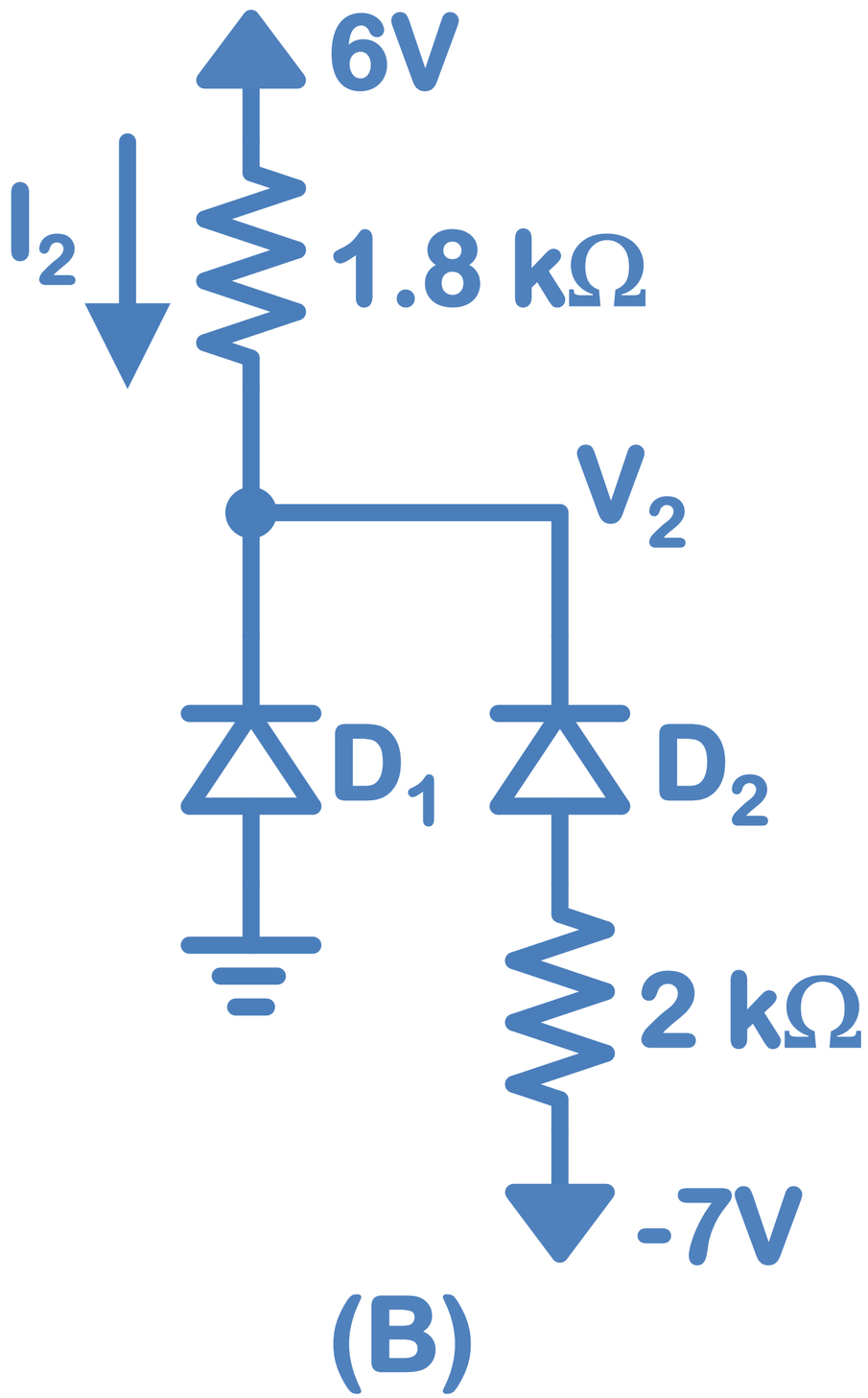
1. FB, FB
2. shorts (vD1=0, vD2=0)
3. Find I1, V1, iD1, iD2

V1 = 0
I1 = 6-0/1.5k = 4mA
iD2 = 0- -5/2k = 2.5mA
iD1 = 4-2.5 = 1.5mA

4. check
iD1>0 Yes
iD2>0 Yes

5. Done

Problem 2. Find $V_{1,2,3}$ and $I_{1,2,3}$ in the circuits below. All diodes are ideal.



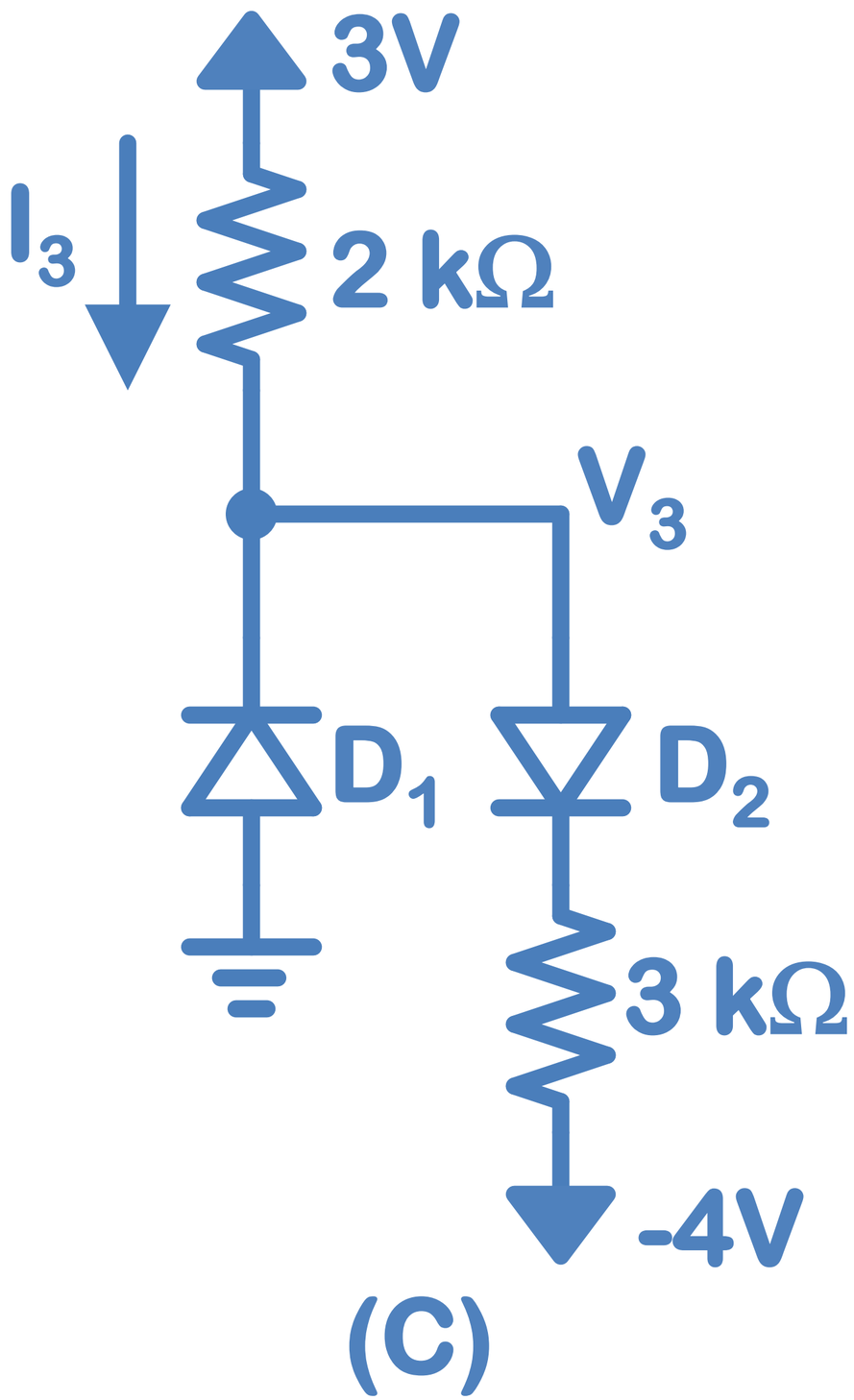
1. RB, RB
2. opens (iD1=0, iD2=0)
3. Find I2, V2, vD1, vD2

V2 = 6
I2 = 0
vD1 = 0- 6 = -6V
vD2 = -7 -6 = -13V

4. check
vD1<0 Yes
vD2<0 Yes

5. Done

Problem 2. Find $V_{1,2,3}$ and $I_{1,2,3}$ in the circuits below. All diodes are ideal.



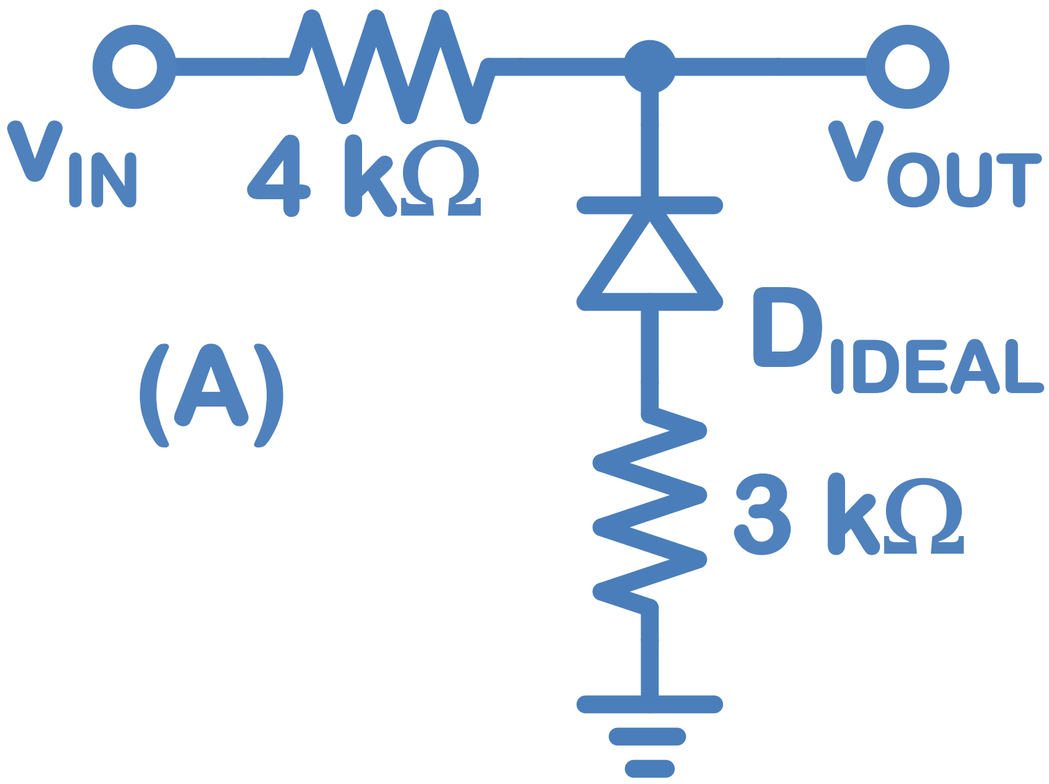
1. RB, FB
2. open, short (iD1=0, vD2=0)
3. Find I3, V3, iD1, iD2

I3 = (3- -4)/(2k + 3k) = 7/5k = 1.4mA
V3 = 3-2k*1.4m = 0.2V
vD1 = 0- 0.2 = -0.2V
iD2 = I3 = 1.4mA

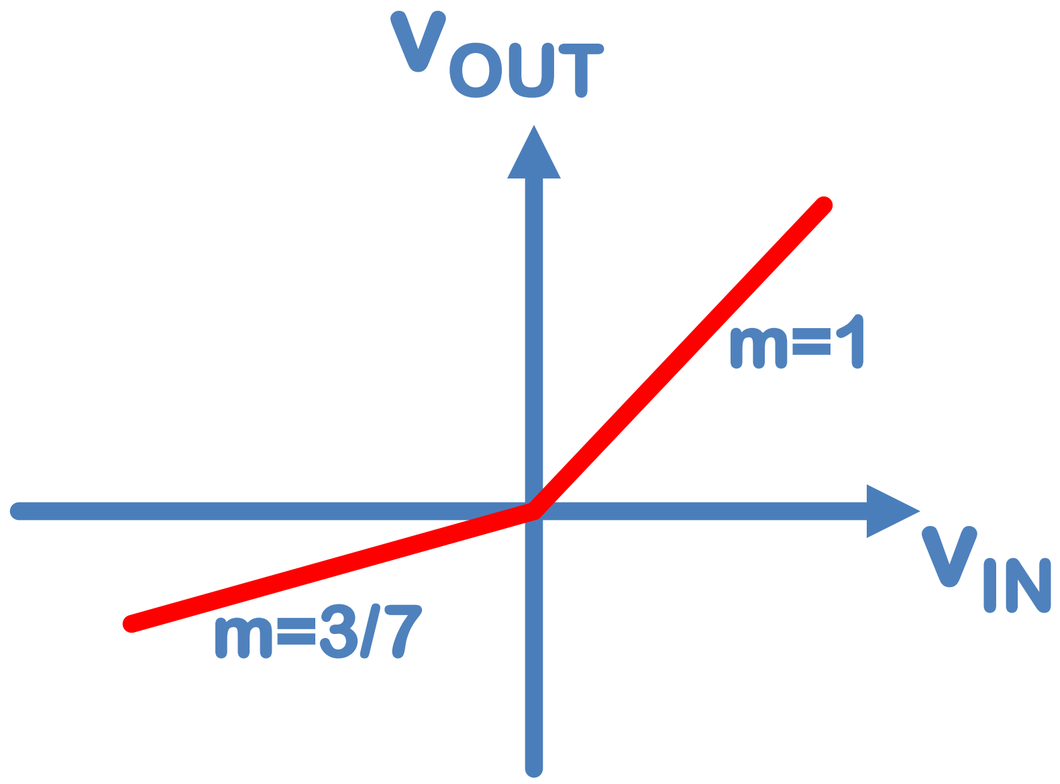
4. check
vD1<0 Yes
iD2>0 Yes

5. Done

Problem 3. Find the equations and plot $v_{OUT}(v_{IN})$ for each circuit.



(A)

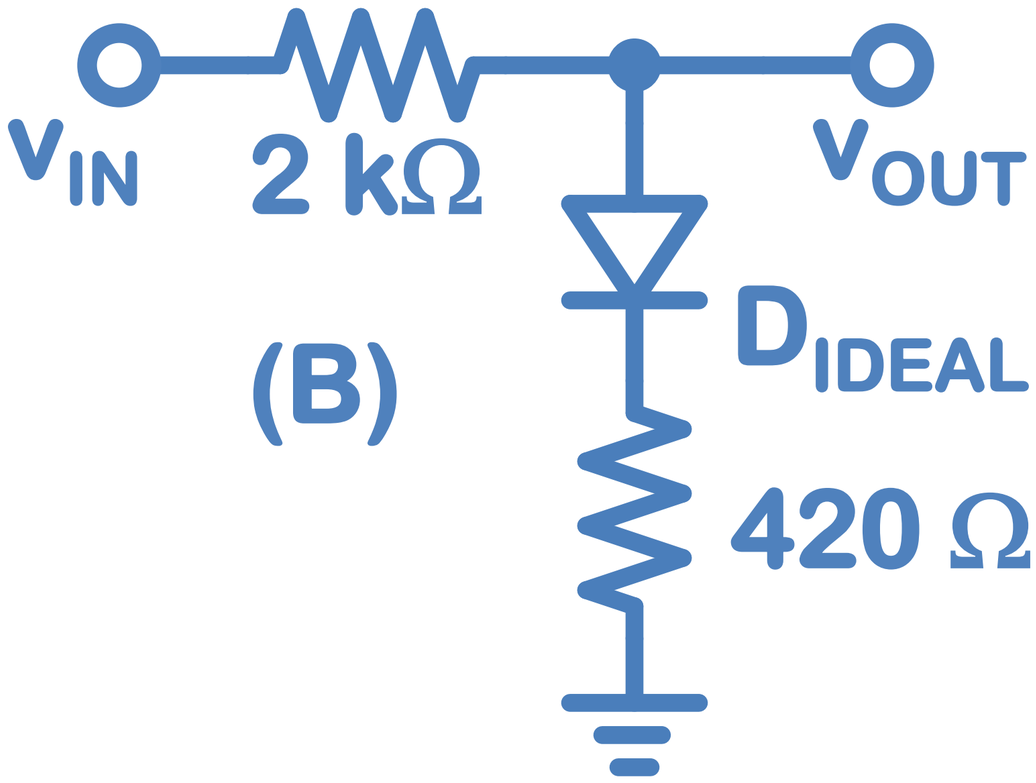


1. FB case:
2. short (vD=0)
3. vOUT=(3/(3+4))vIN
   vOUT = (3/7)vIN
   iD = (0-vIN)/(4k+3k))
4. apply iD>0, therfore
   vIN < 0
5. Next

1. RB case:
2. open (iD=0)
3. vOUT=vIN
   vD = (0-vIN)
4. apply vD<0, therfore
   vIN > 0
5. Done

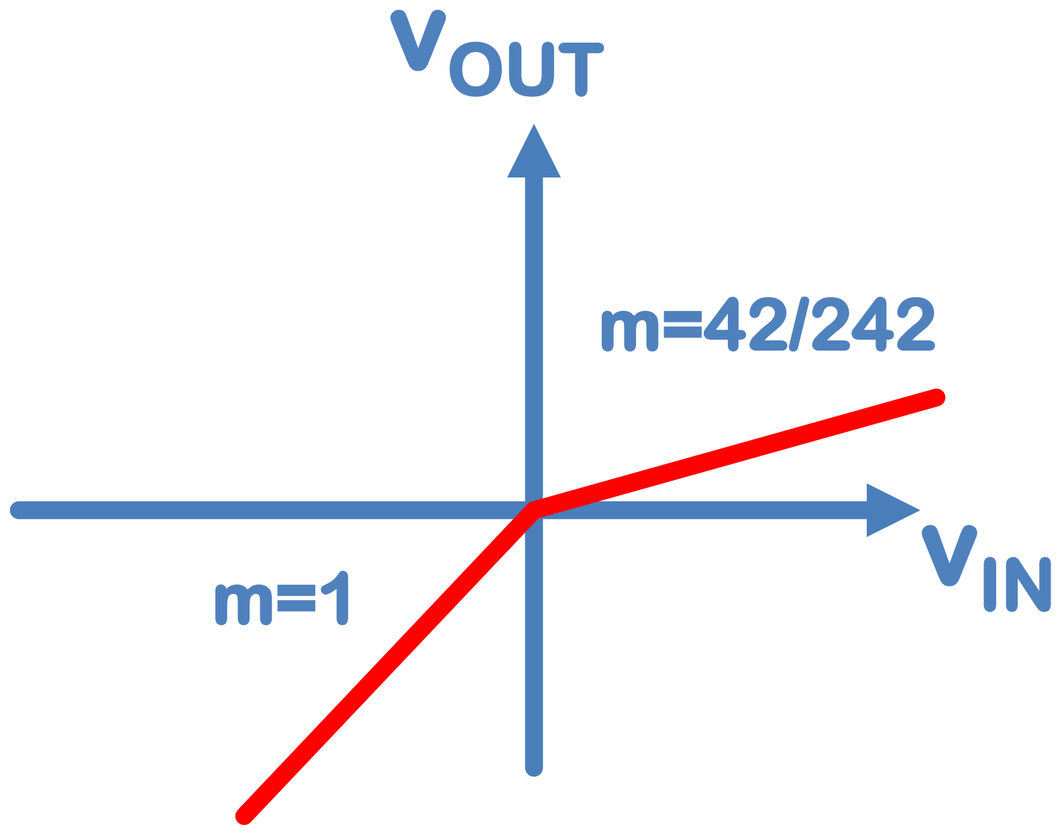
answer:
vOUT = (3/7)vIN, vIN<0
vOUT = vIN, vIN >0

Problem 3. Find the equations and plot $v_{OUT}(v_{IN})$ for each circuit.



(B)

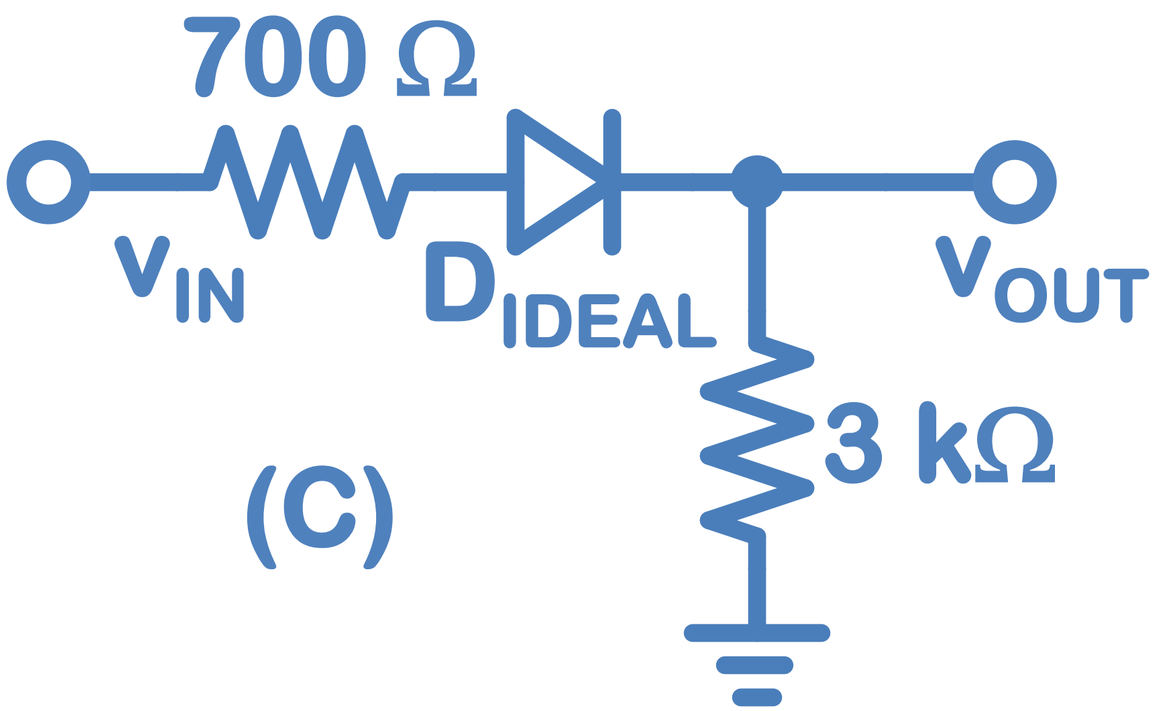
1. FB case:
2. short (vD=0)
3. vOUT=(420/(420+2k))vIN
   vOUT = (42/242)vIN
   iD = (vIN-0)/(2420))
4. apply iD>0, therfore
   vIN > 0
5. Next



1. RB case:
2. open (iD=0)
3. vOUT=vIN
   vD = (vIN-0)
4. apply vD<0, therfore
   vIN < 0
5. Done

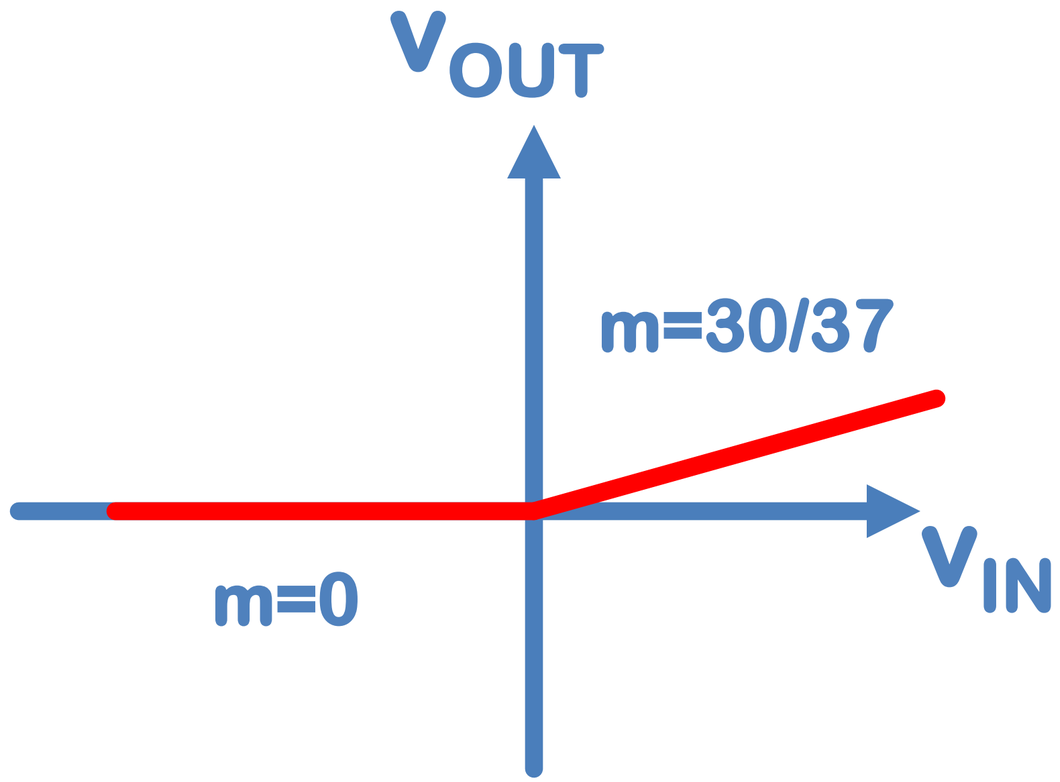
answer:
vOUT = (42/242)vIN, vIN>0
vOUT = vIN, vIN<0

Problem 3. Find the equations and plot $v_{OUT}(v_{IN})$ for each circuit.



(C)

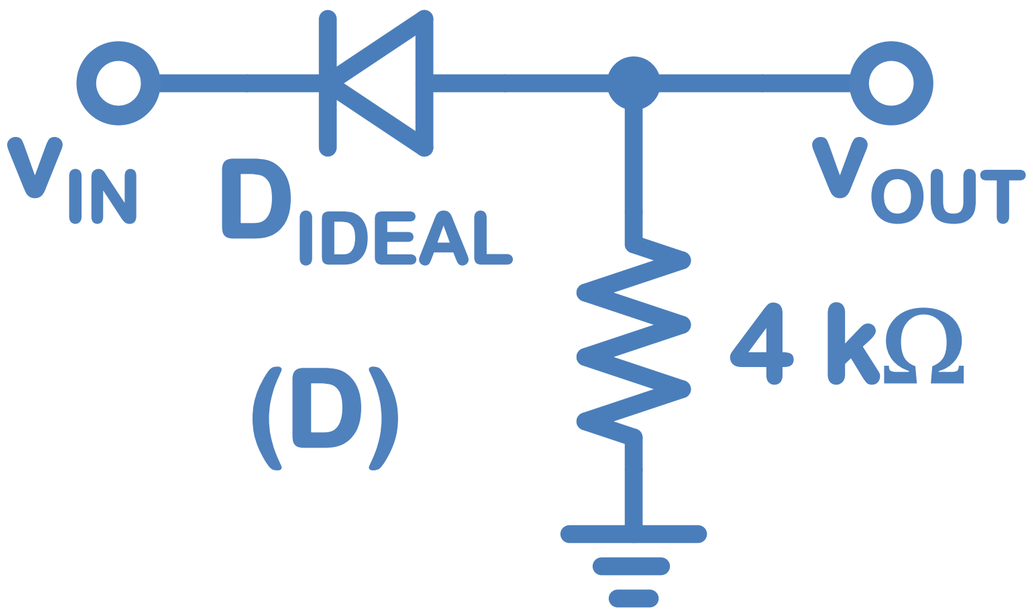
1. FB case:
2. short (vD=0)
3. vOUT=(3k/(700+3k))vIN
 vOUT = (30/37)vIN
 iD = (vIN-0)/(3700))
4. apply iD>0, therfore
  vIN > 0
5. Next

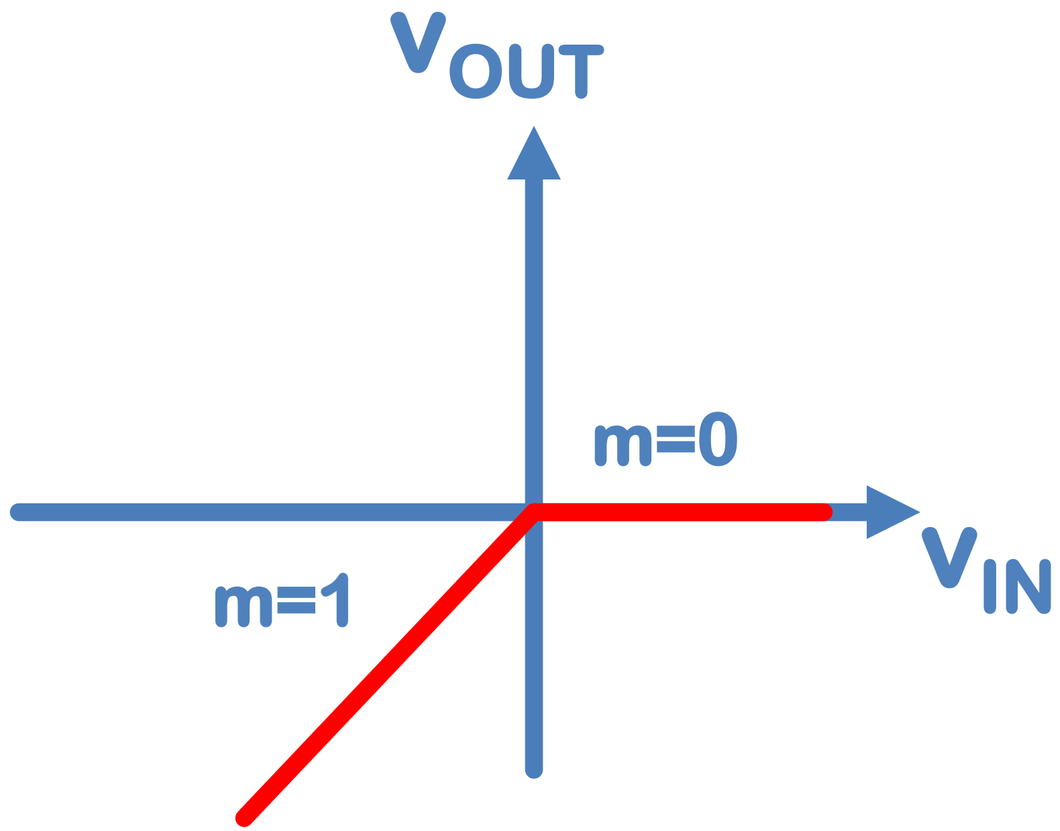


1. RB case:
2. open (iD=0)
3. vOUT=0
 vD = vIN-vOUT
vD = vIN-0
4. apply vD<0, therfore
  vIN < 0
5. Done

answer:
vOUT = (30/37)vIN, vIN>0
vOUT = 0, vIN<0

Problem 3. Find the equations and plot $v_{OUT}(v_{IN})$ for each circuit.





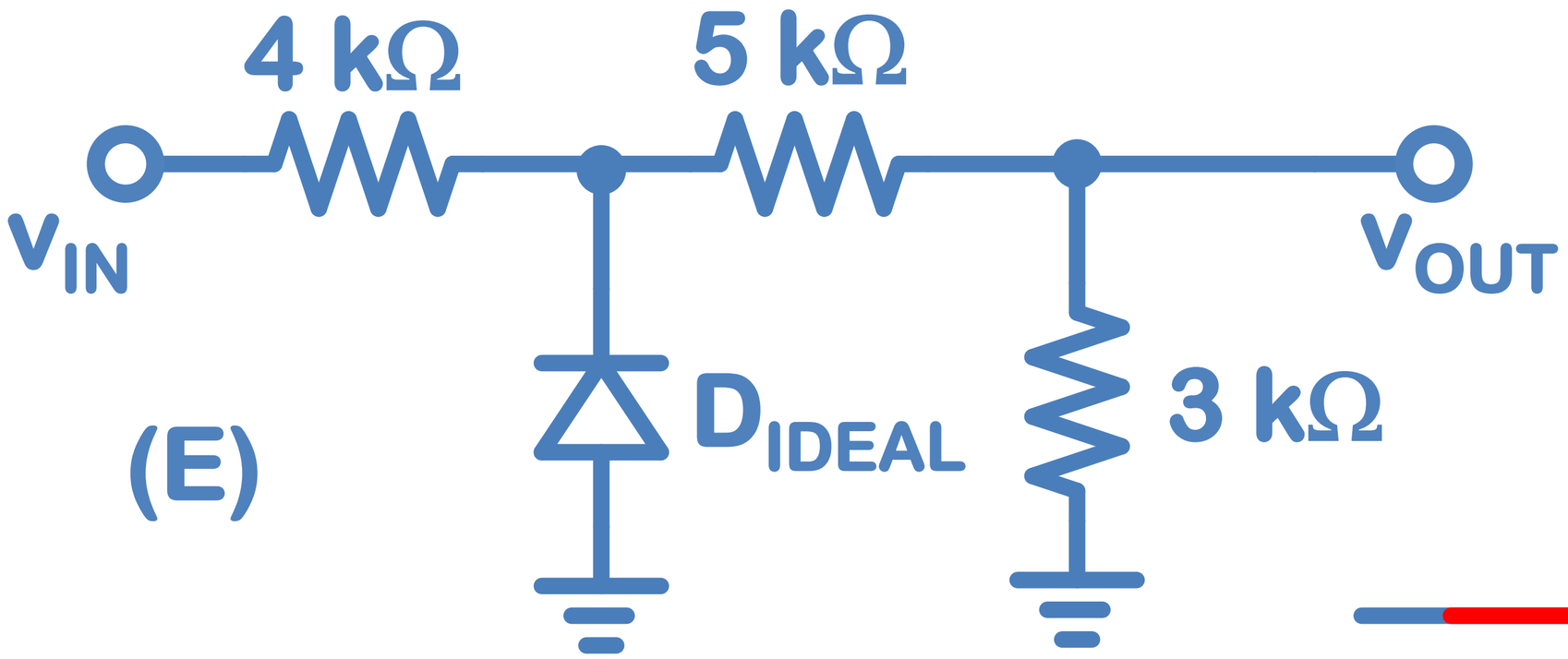
1. FB case:
2. short (vD=0)
3. vOUT=vIN
   iD = (0-vIN)/(4k)
4. apply iD>0, therfore
   vIN < 0
5. Next

1. RB case:
2. open (iD=0)
3. vOUT=0
   vD = vOUT-vIN
   vD = -vIN
4. apply vD<0, therfore
   vIN > 0
5. Done

answer:
vOUT = vIN, vIN<0
vOUT = 0, vIN>0

Problem 3.

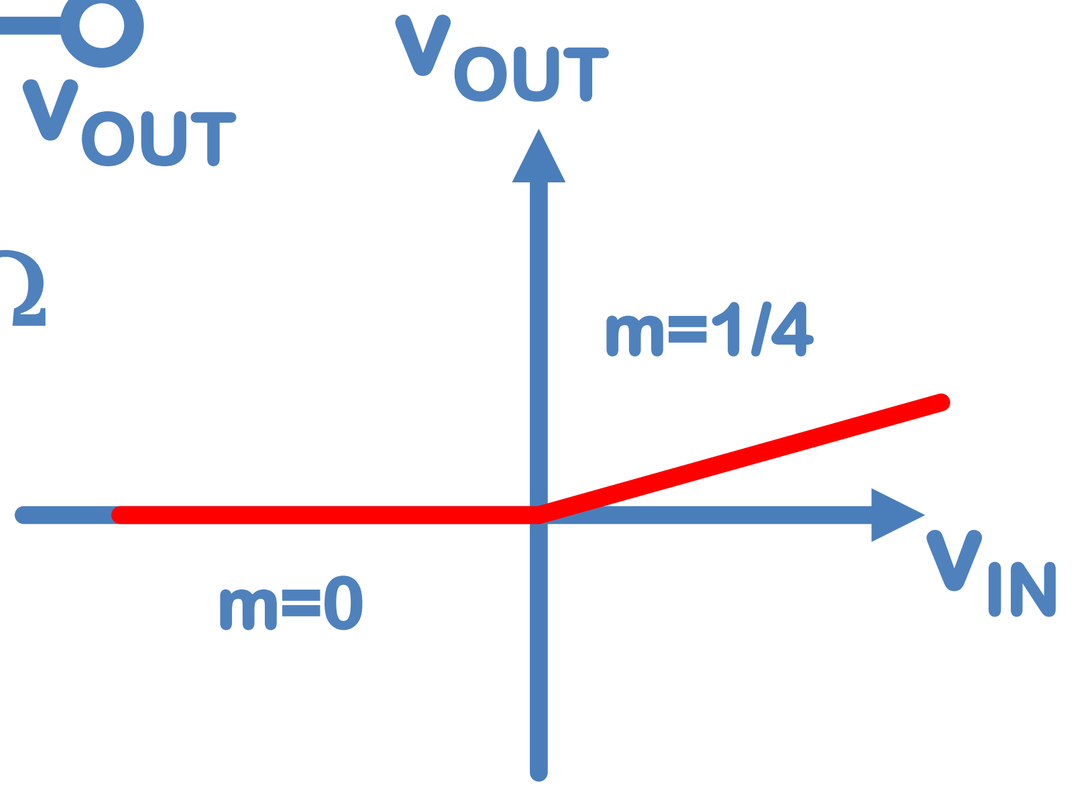
a) Find the equation and plot $v_{OUT}(v_{IN})$ for each circuit.



(E)

1. FB case:
2. short (vD=0)
3. vOUT=0
   iD = (0-vIN)/(4k)
4. apply iD>0, therfore
   vIN < 0
5. Next

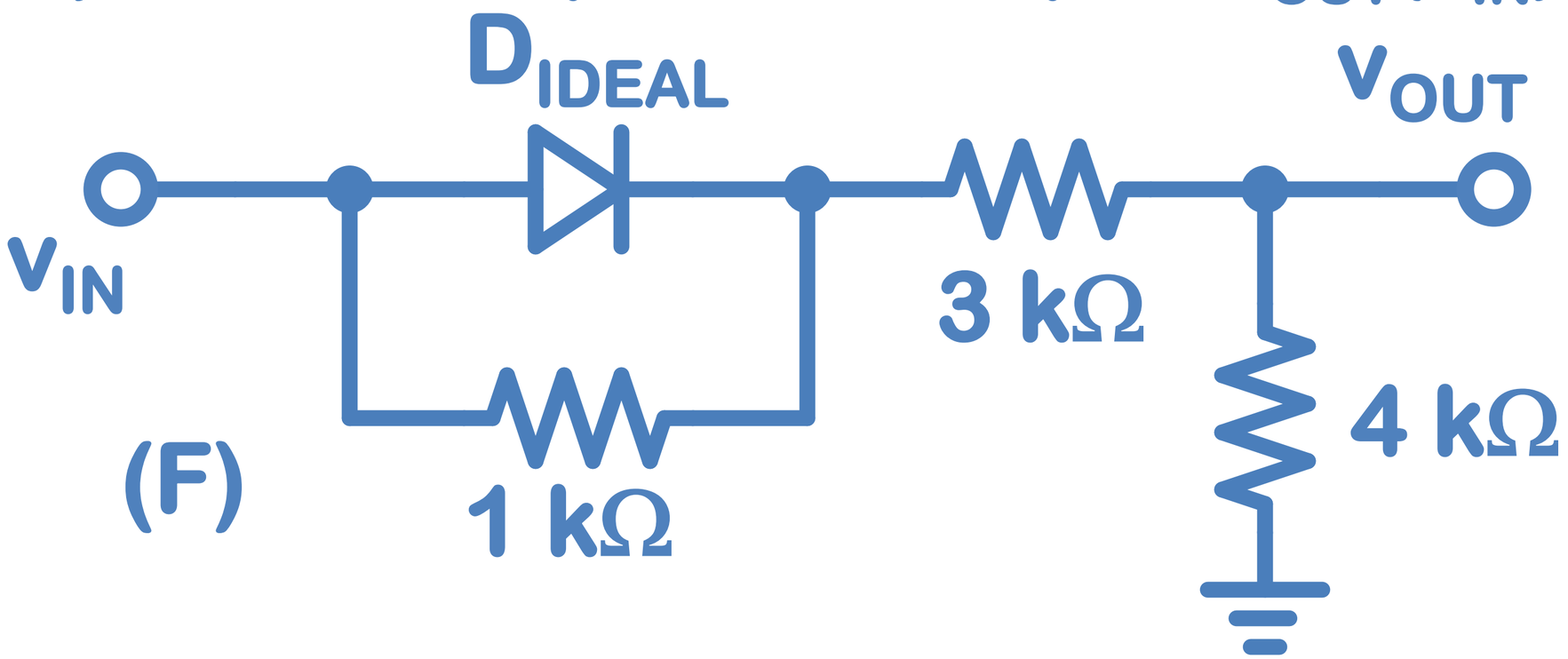
1. RB case:
2. open (iD=0)
3. vOUT=(3k/(4k+5k+3k))vIN
   vOUT = (1/4)vIN
   vD- = (8k/12k)vIN
   vD = 0-(2/3)vIN
4. apply vD<0, therfore
   vIN > 0
5. Done

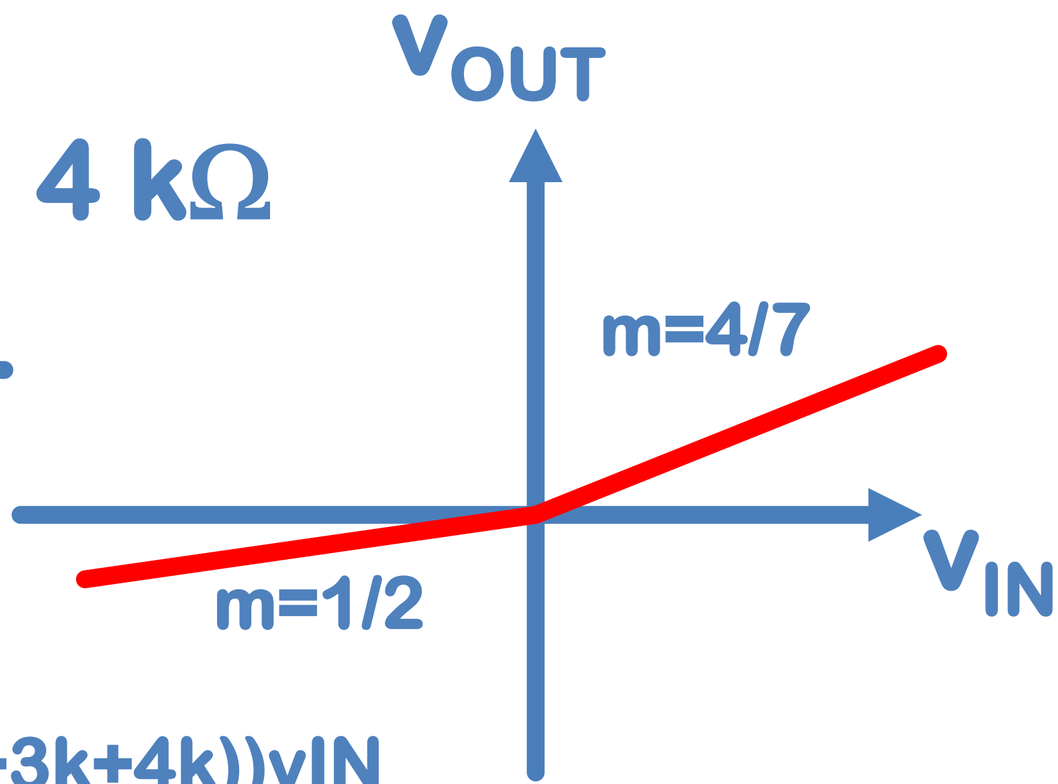


answer:
vOUT = 0, vIN<0
vOUT = (1/4)vIN, vIN>0

Problem 3.

a) Find the equation and plot $v_{OUT}(v_{IN})$ for each circuit.





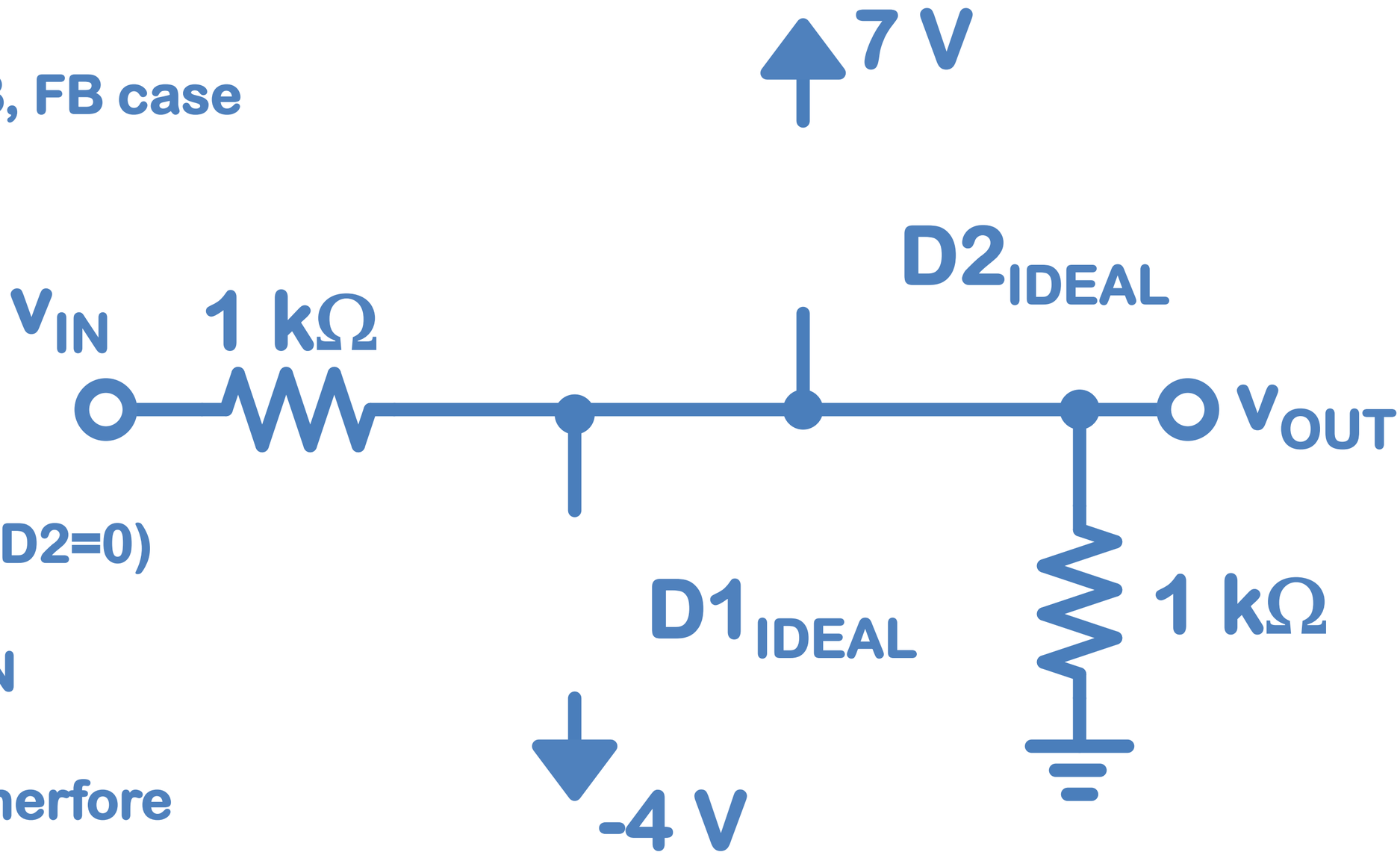
1. FB case:
2. short (vD=0)
3. vOUT=(4k/(3k+4k))vIN
   vOUT = (4/7)vIN
   iD = (vIN)/(7k)
4. apply iD>0, therfore
   vIN > 0
5. Next

1. RB case:
2. open (iD=0)
3. vOUT=(4k/(1k+3k+4k))vIN
   vOUT = (1/2)vIN
   vD- = (7/8)vIN
   vD = vIN-(7/8)vIN = vIN/8
4. apply vD<0, therfore
   vIN < 0
5. Done

answer:
vOUT = (4/7)vIN, vIN>0
vOUT = (1/2)vIN, vIN<0

Problem 4.

a) Find the equation and plot $v_{OUT}(v_{IN})$ for the circuit.

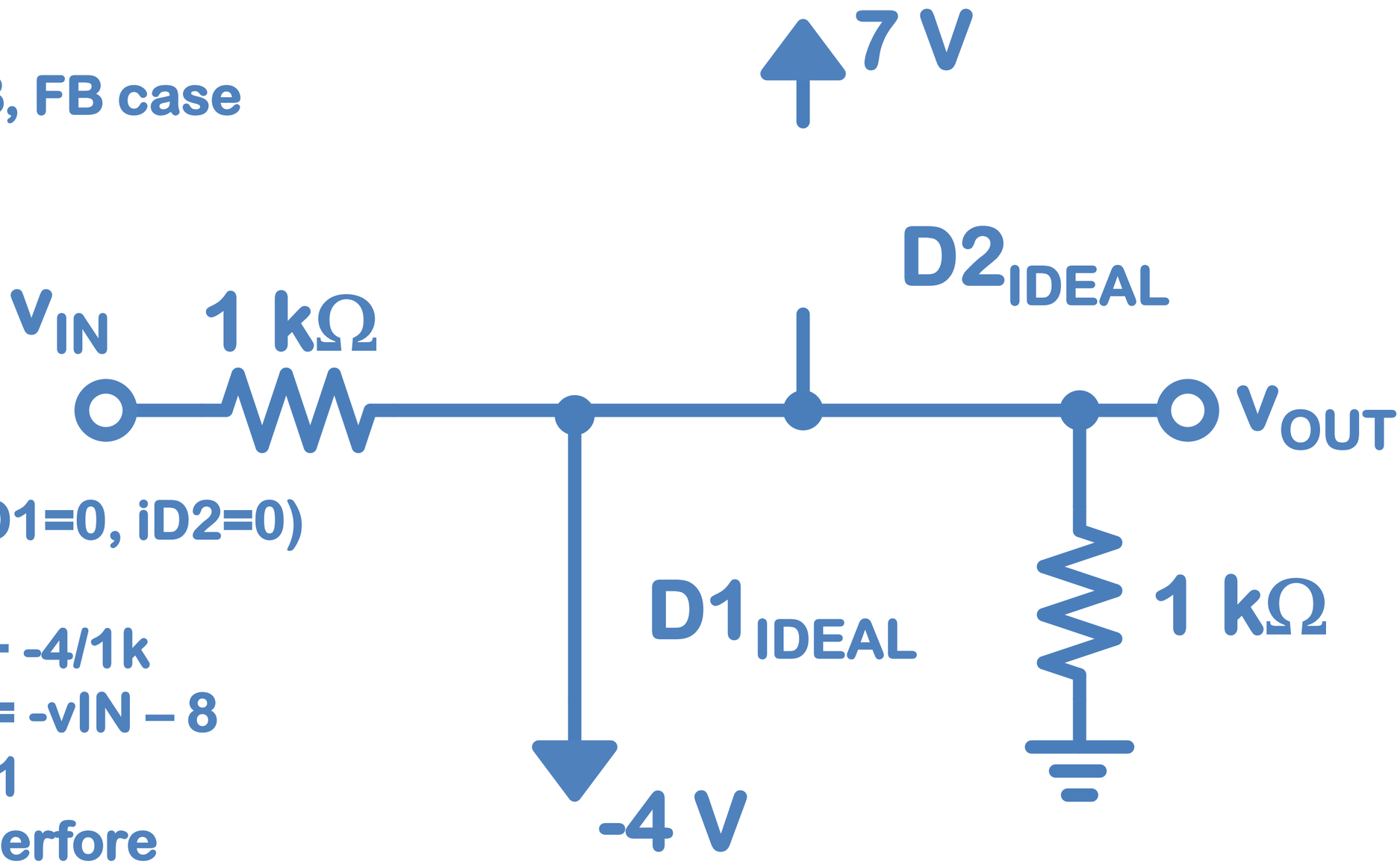


1. don't to FB, FB case
Next

1. RB, RB case:
2. opens (iD1=0, iD2=0)
3. vOUT=(1/2)vIN
vD1 = -4 – (1/2)vIN
vD2 = (1/2)vIN-7
4. apply vD1<0, therfore
vIN > -(8)
apply vD2<0, therfore
vIN < (14)
Intersection is: -(8) < vIN < (14)
5. Next

Problem 4.

a) Find the equation and plot $v_{OUT}(v_{IN})$ for the circuit.

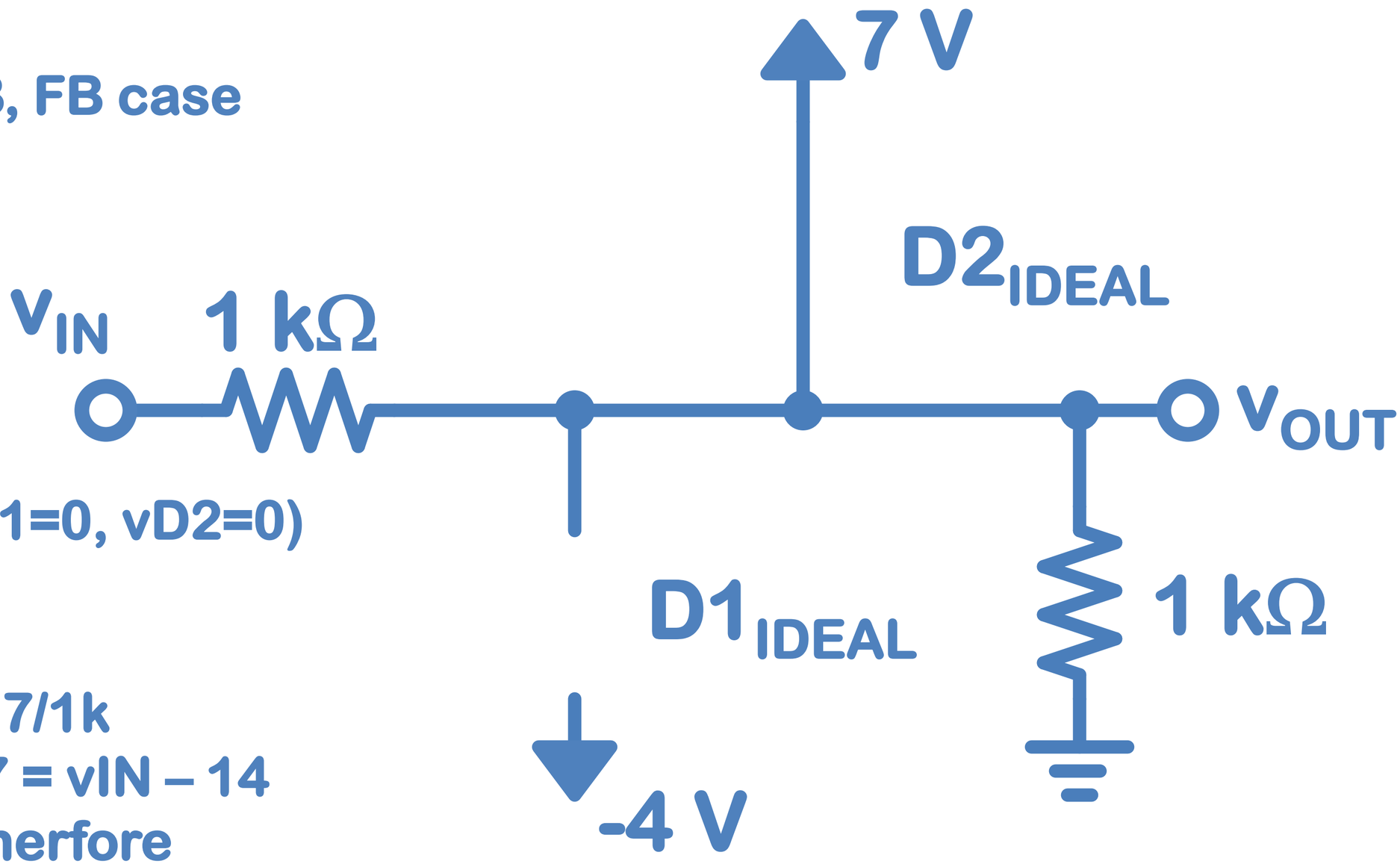


1. don't to FB, FB case
Next

1. FB, RB case:
2. short, open (vD1=0, iD2=0)
3. vOUT= -4
iD1 = (-4-vIN)/1k + -4/1k
iD1 = -4 – vIN – 4 = -vIN – 8
vD2 = (-4 – 7) = -11
4. apply iD1>0, therfore
vIN < -(8)
apply vD2<0, therfore
always
Intersection is: vIN < -(8)
5. Next

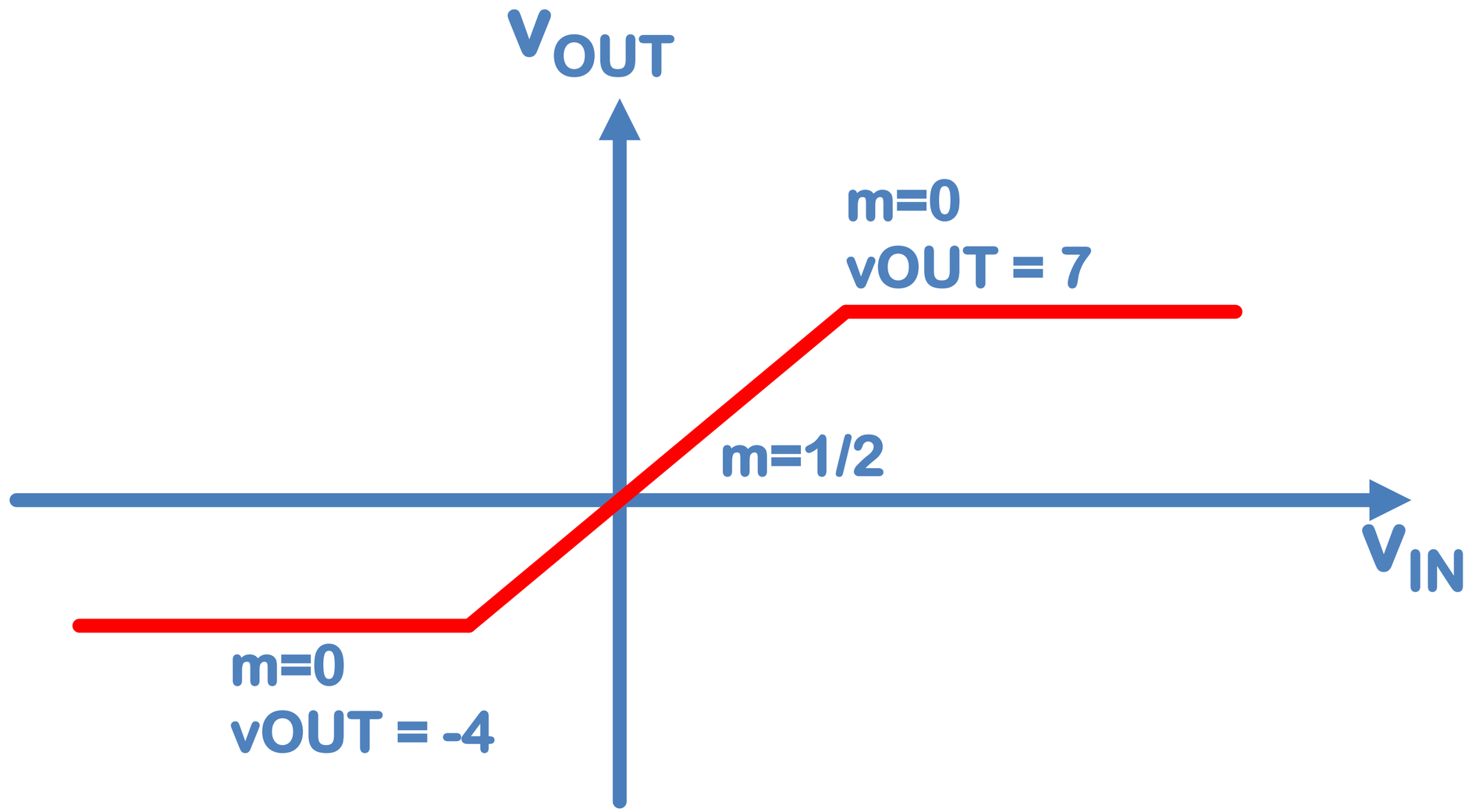
Problem 4.

a) Find the equation and plot $v_{OUT}(v_{IN})$ for the circuit.



1. don't to FB, FB case
Next

1. RB, FB case:
2. open, short (iD1=0, vD2=0)
3. vOUT= 7
vD1 = -4 – 7 = -11
iD2 = (vIN-7)/1k – 7/1k
3*iD2 = vIN – 7 – 7 = vIN – 14
4. apply vD1<0, therfore
always
apply iD2>0, therfore
vIN > 14
Intersection is: vIN > 14
5. Next



vOUT=(1/2)vIN, -(8) < vIN < (14)
vOUT=-4, vIN < -(8)
vOUT=7, vIN > (14)