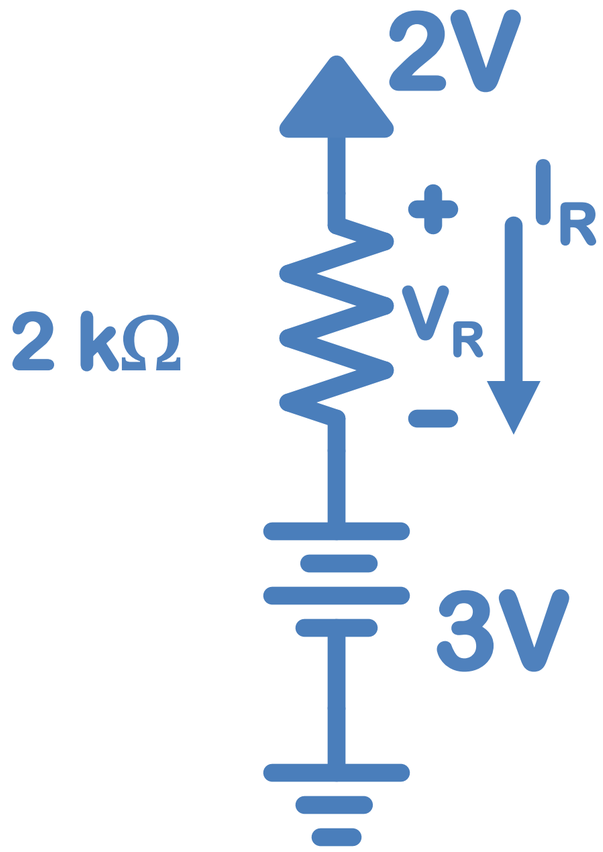
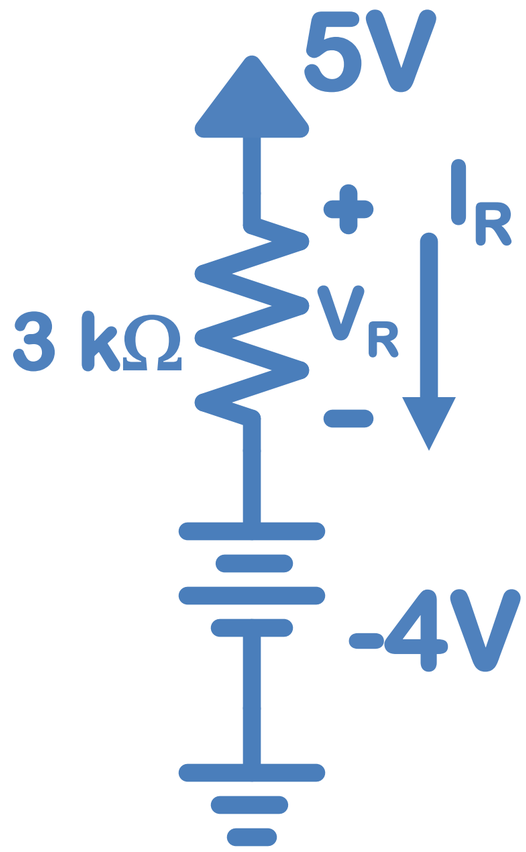
1) Find V_R and I_R for each circuit.



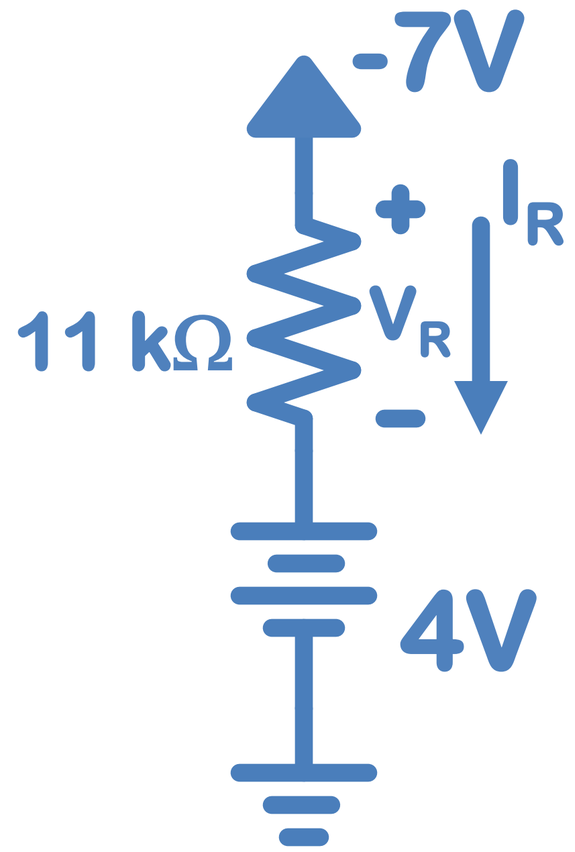
(A)

V_R=2-3=-1V
I_R=-1/2k=-0.5mA



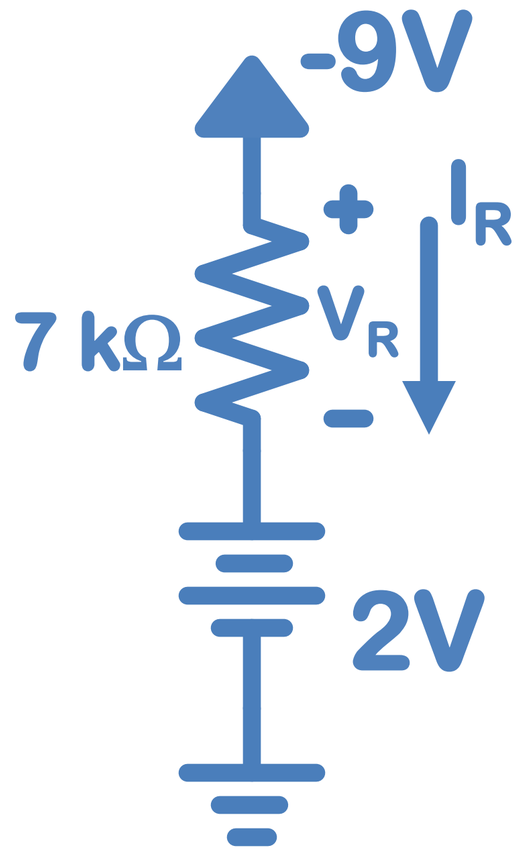
(B)

V_R=5 - -4=9V
I_R=9/3k=3mA



(C)

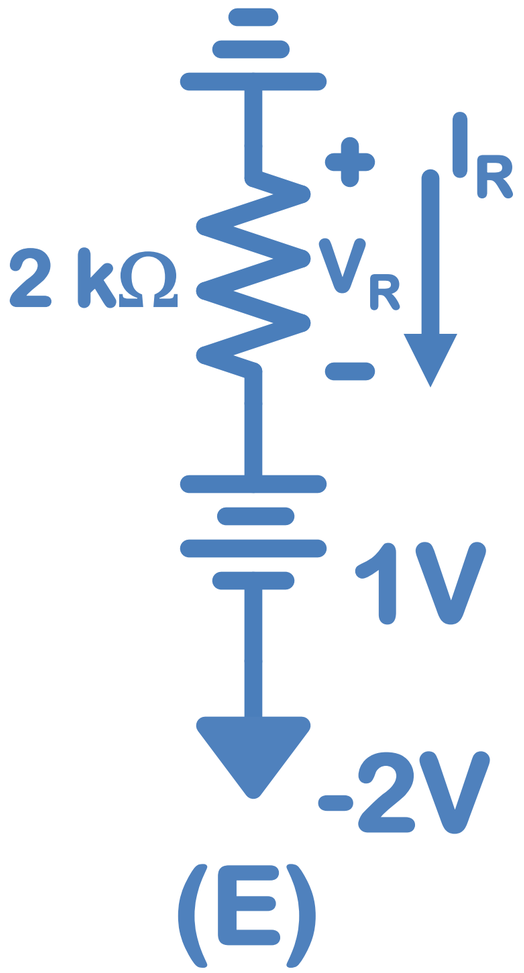
V_R=-7-4=-11V
I_R=-11/11k=-1mA



(D)

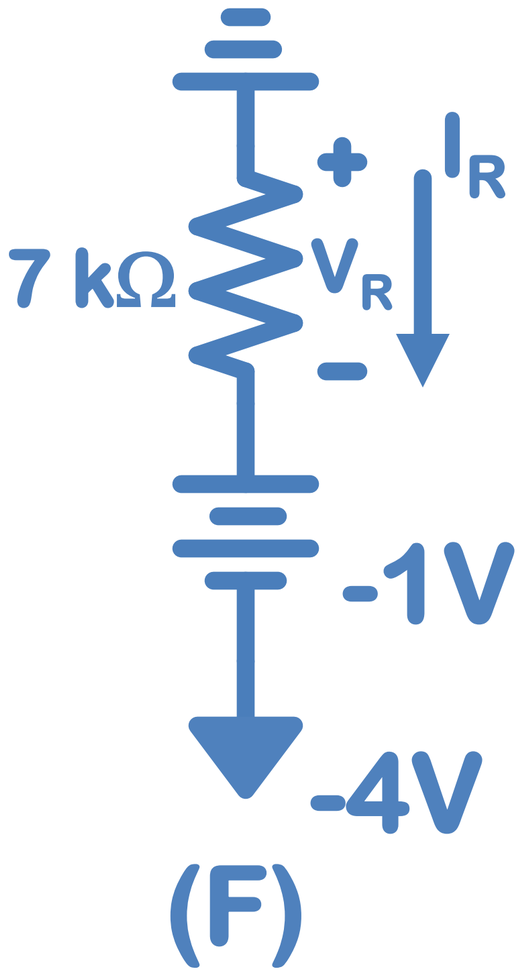
V_R=-9-2=-11V
I_R=-11/7k=-1.571mA

1) Find V_R and I_R for each circuit.



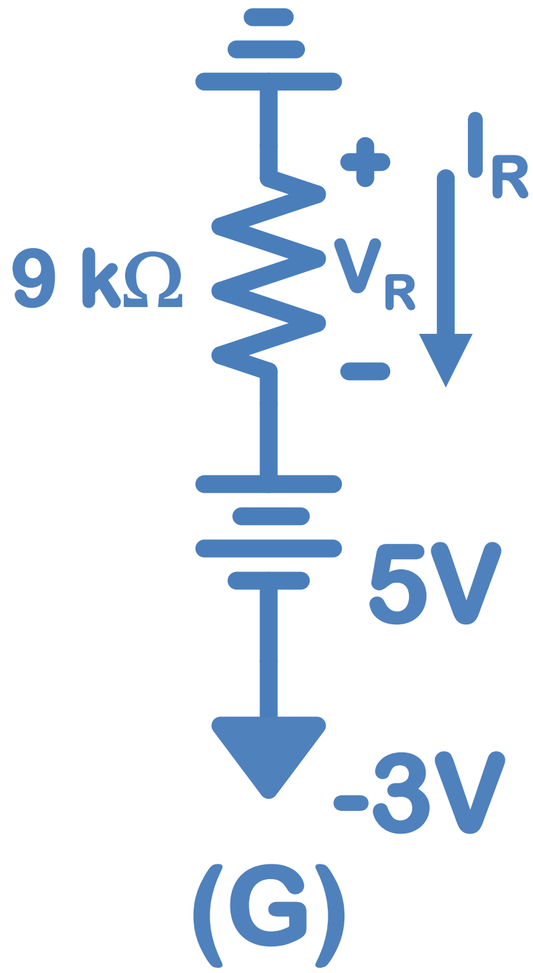
(E)

V_R- = -2+1=-1V
V_R=0 - -1=1V
I_R=1/2k=0.5mA



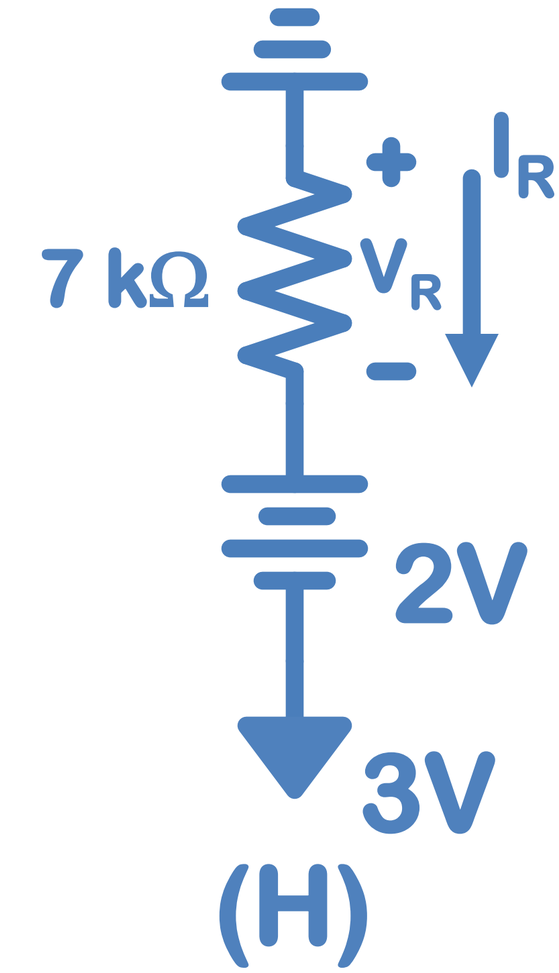
(F)

V_R- = -4-1=-5V
V_R=0 - -6=5V
I_R=5/7k=0.714mA



(G)

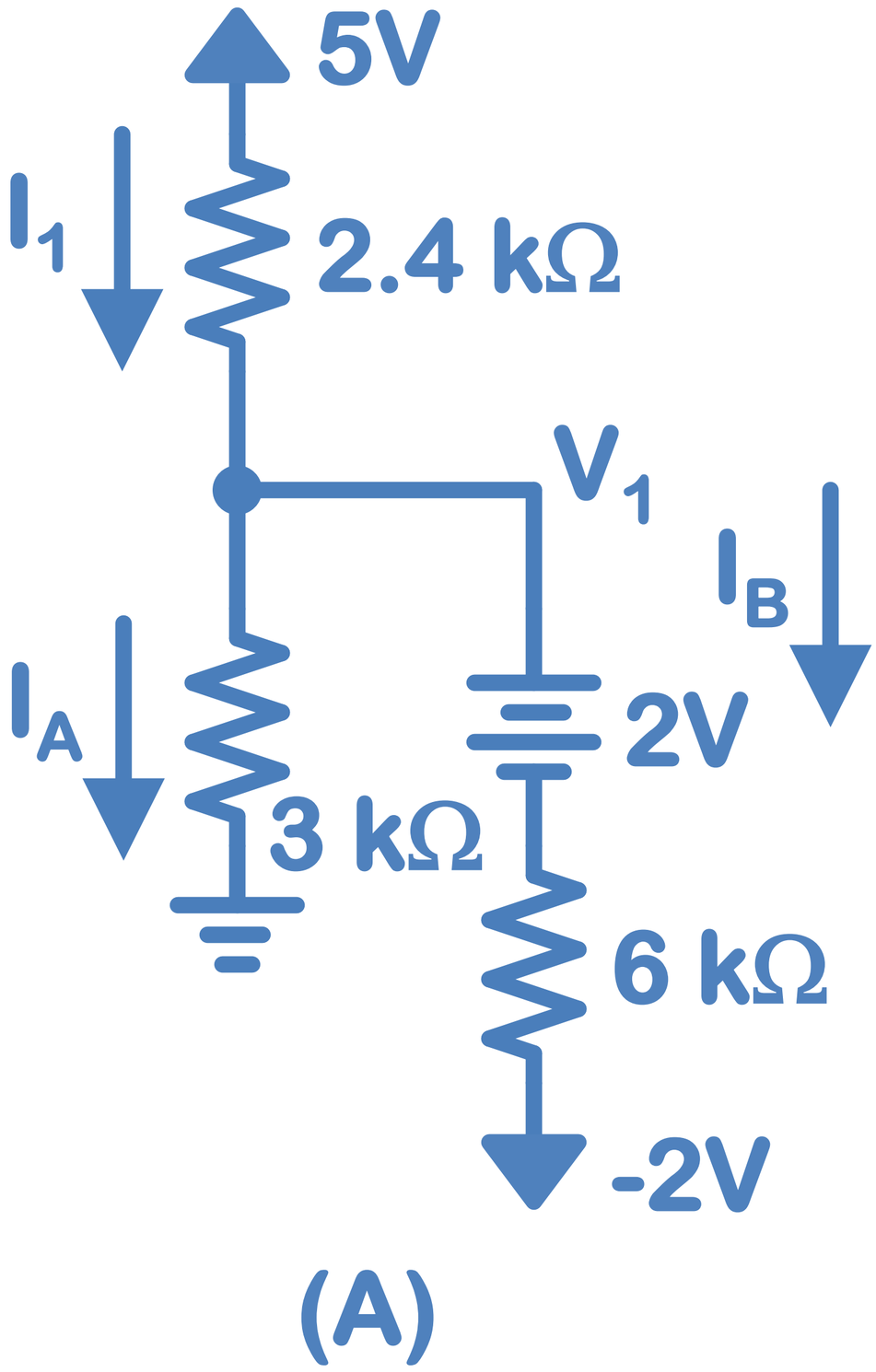
V_R- = -3+5=2V
V_R=-0- 2=-2V
I_R=-2/9k=-0.222mA



(H)

V_R- = 3+2=5V
V_R=-0-5=-5V
I_R=-5/7k=-0.714mA

2) Find $V_{1,2,3}$ and $I_{1,2,3}$ in the circuits below.



(A)

KCL at V1

$I_1 = I_A + I_B$

Ohms Law For Each Current

(5-V1)/2.4k = V1/3k + (V1-2- -2)/6k

Solve

V1(1/3k + 1/2.4k + 1/6k) = (5/2.4k)

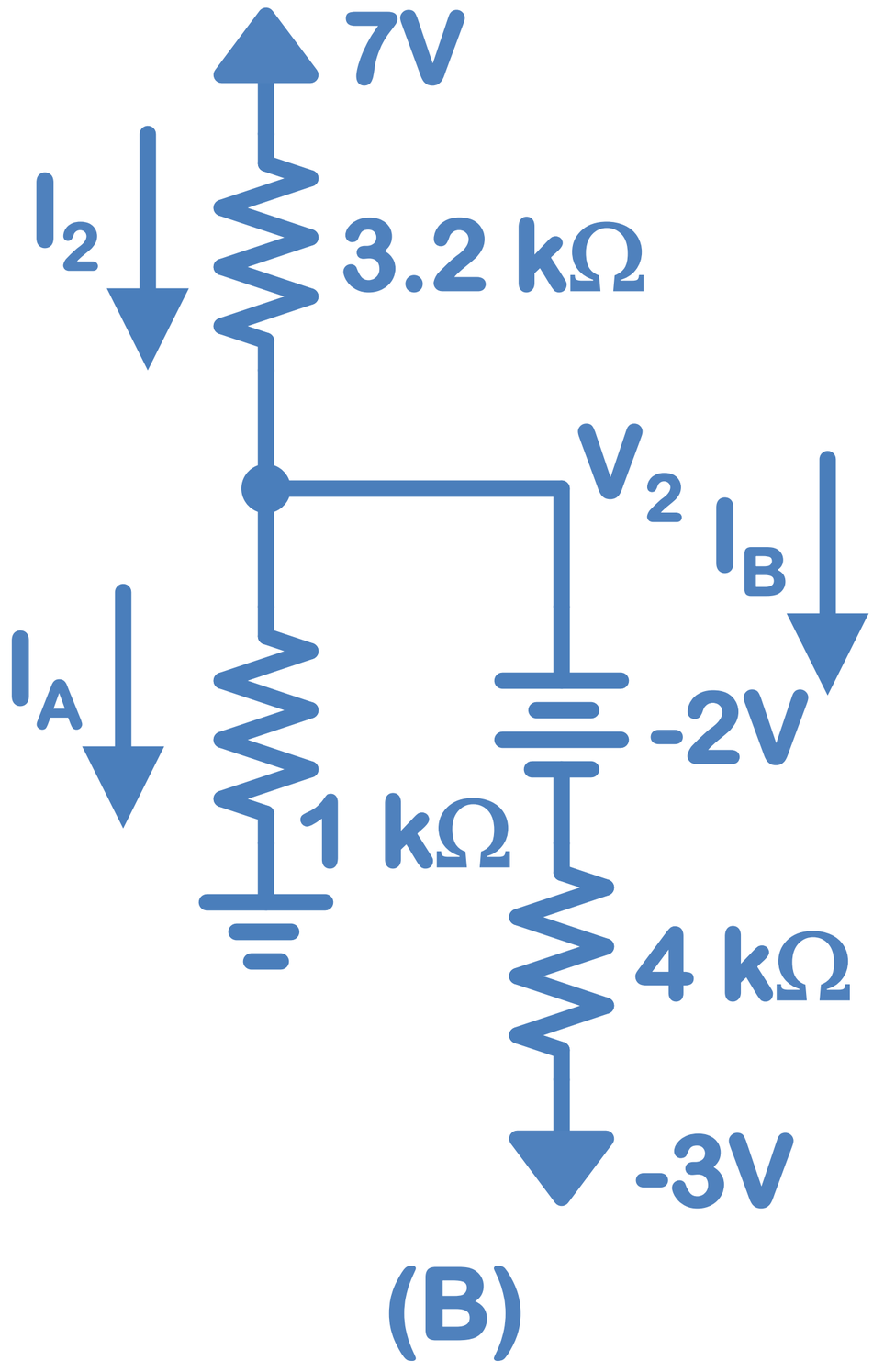
V1 = 2.273V

I1 = (5-2.273)/2.4k = 1.136mA

Check

IA+IB = 2.273/3 + (2.273)/6 = 1.136mA

2) Find $V_{1,2,3}$ and $I_{1,2,3}$ in the circuits below.



(B)

KCL at V2

$I_2 = I_A + I_B$

Ohms Law For Each Current

(7-V2)/3.2k = V2/1k + (V2- -2- -3)/4k

Solve

V2(1/1k + 1/3.2k + 1/4k) = (7/3.2k - 5/4k)

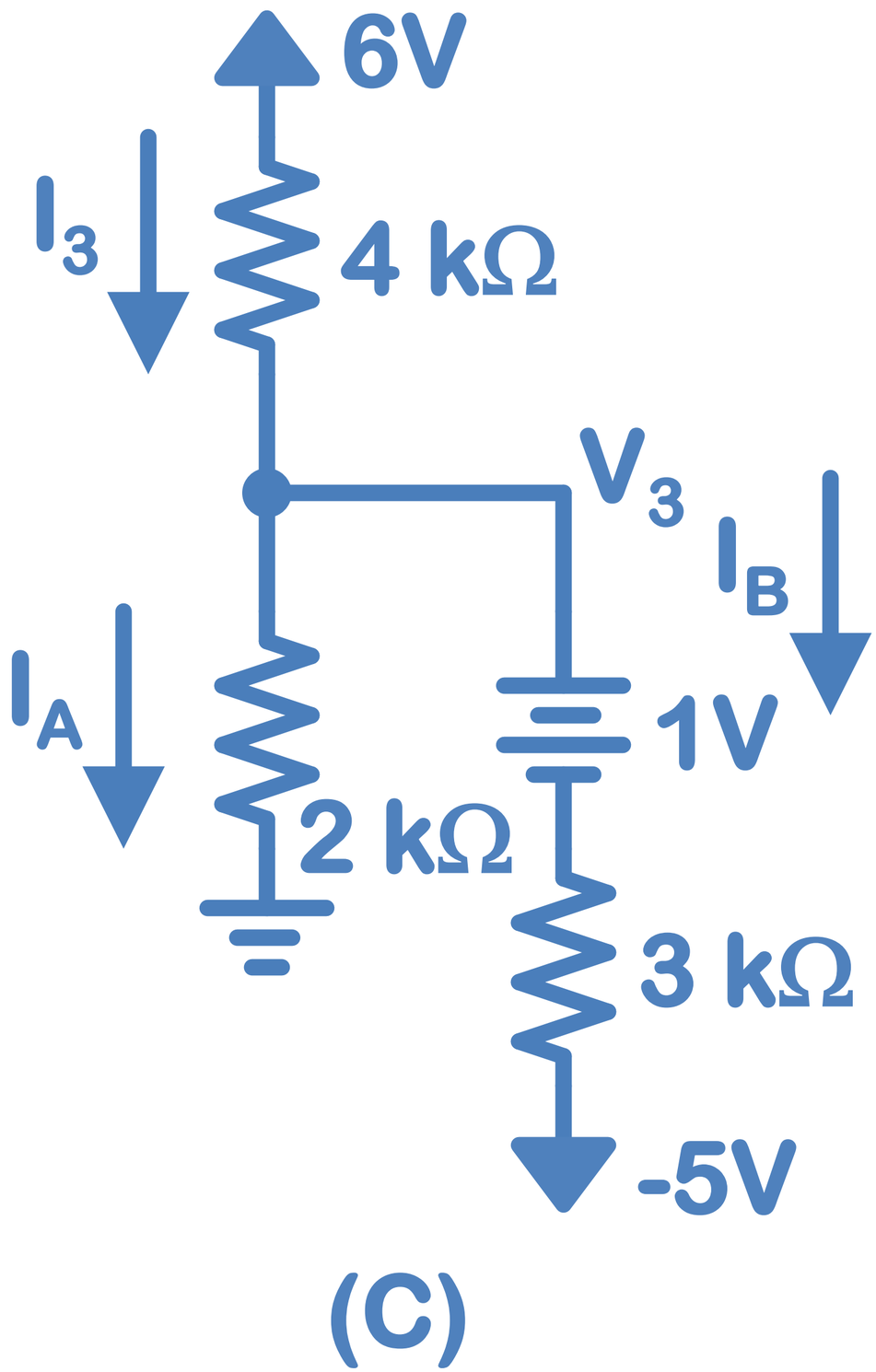
V2 = 0.6V

I2 = (7 -0.6)/3.2k = 2.00mA

Check

IA+IB = 0.6/1 + (0.6+5)/4 = 2.00mA

2) Find $V_{1,2,3}$ and $I_{1,2,3}$ in the circuits below.



(C)

KCL at V3

$I_3 = I_A + I_B$

Ohms Law For Each Current

(6-V3)/4k = V3/2k + (V3 -1- -5)/3k

Solve

V3(1/2k + 1/3k + 1/4k) = (6/4k - 4/3k)

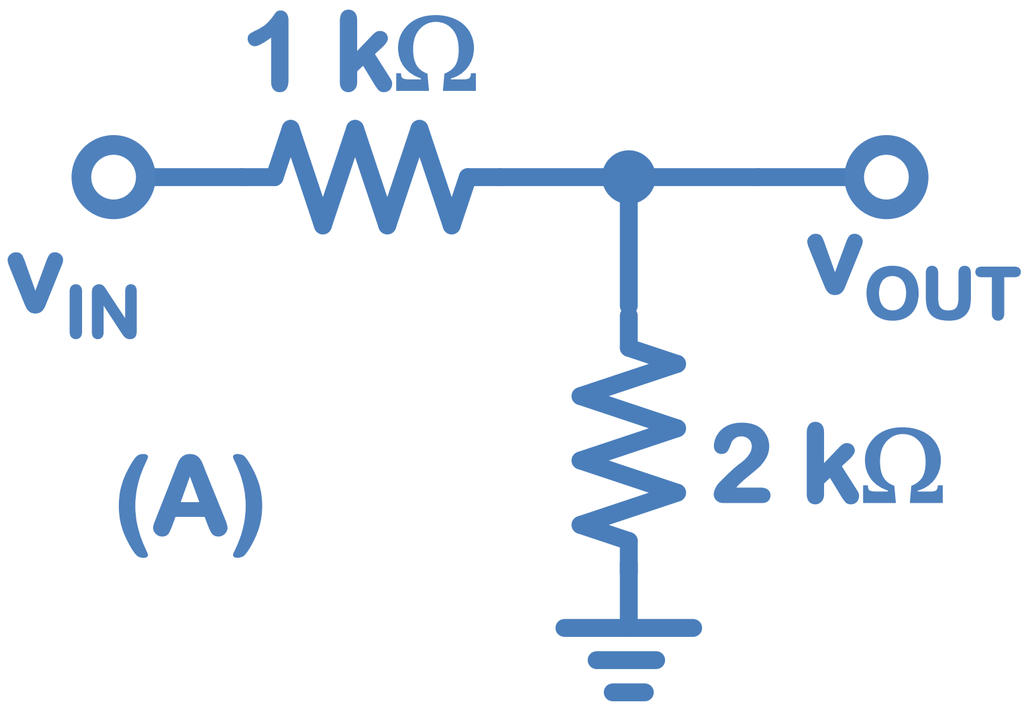
V3 =0.154V

I3 = (6- 2.615)/4k =1.462mA

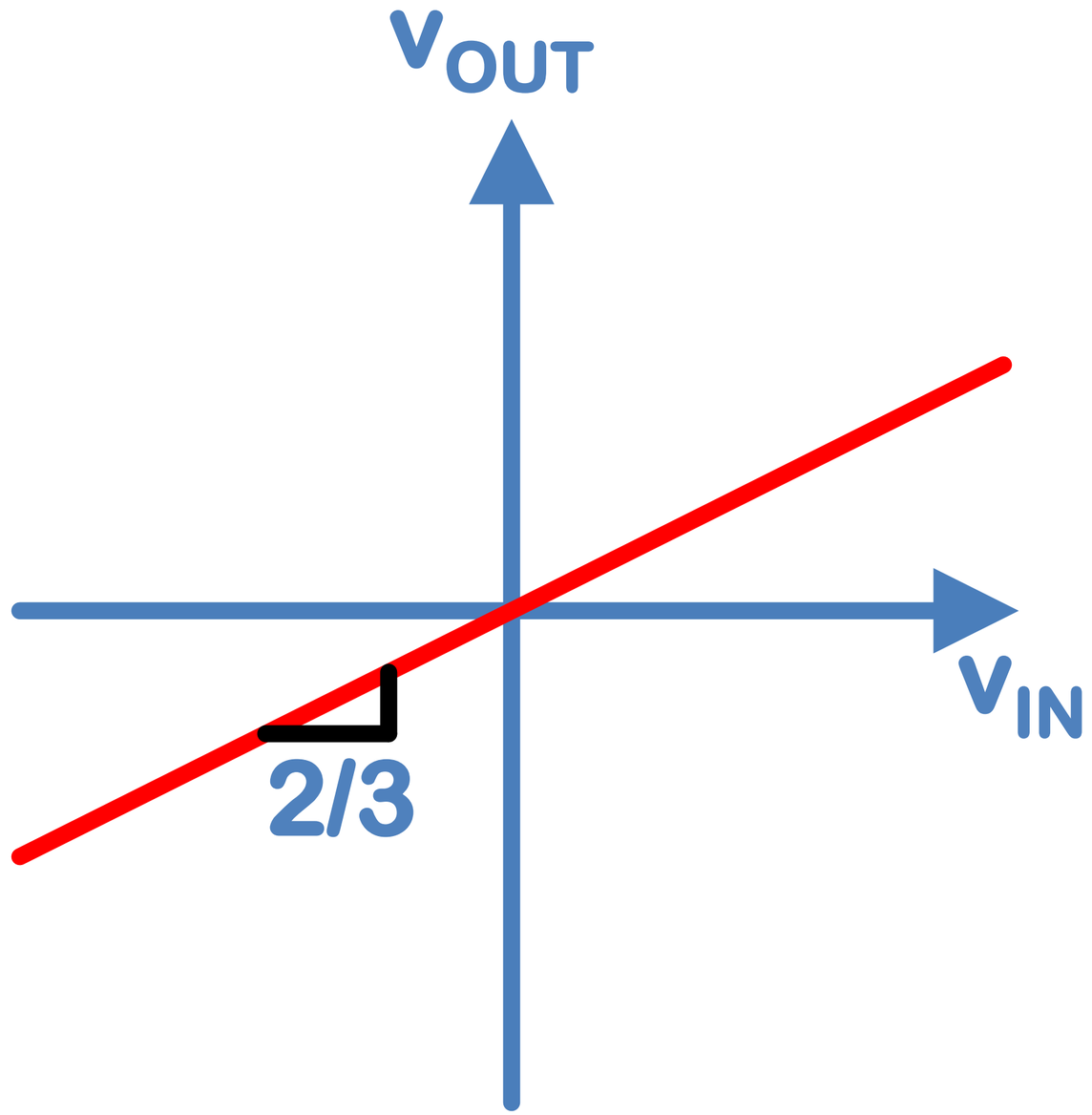
Check

IA+IB = 1.6/2k + (1.6-1)/3k = 1.462mA

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



(A)

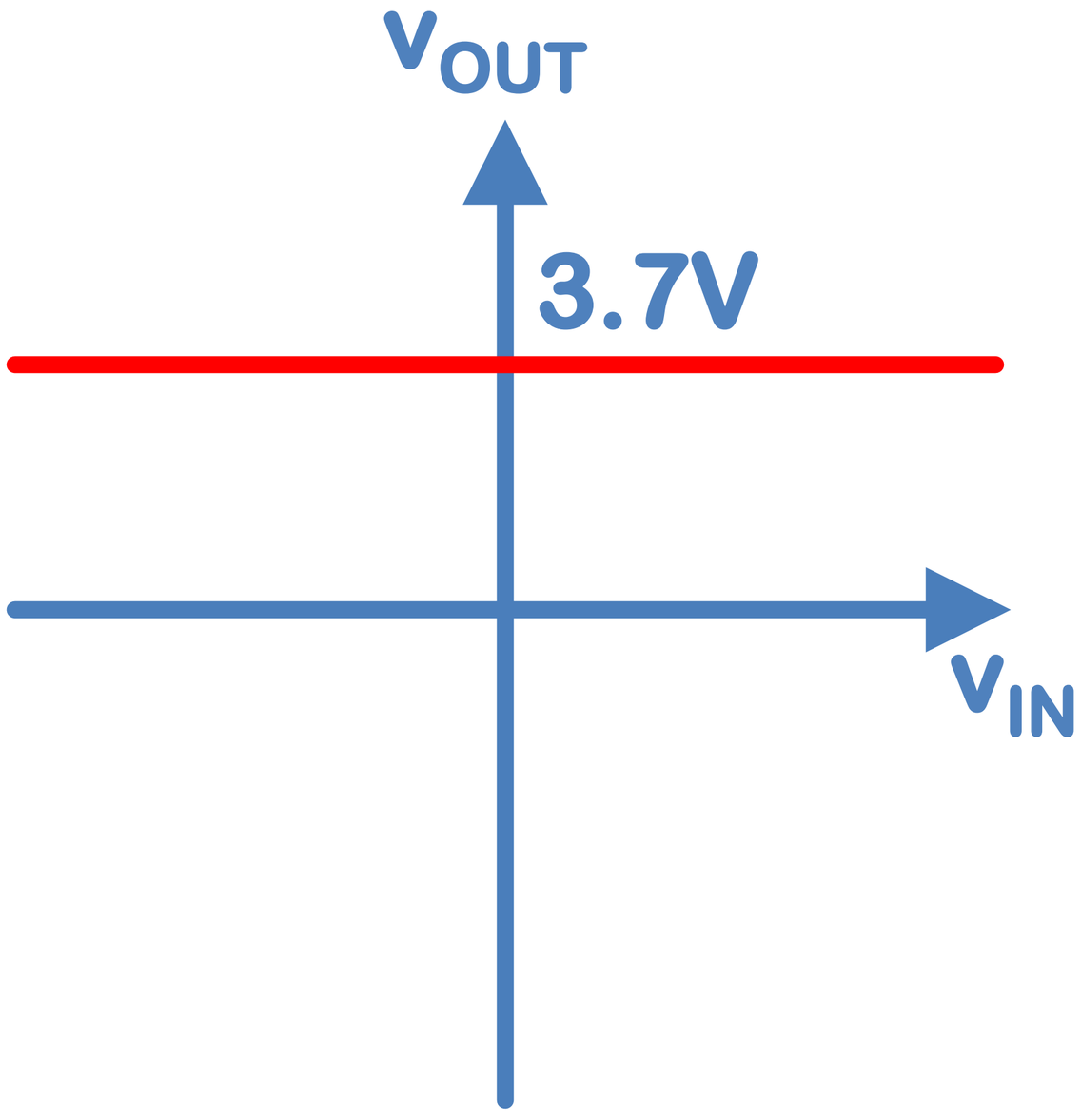


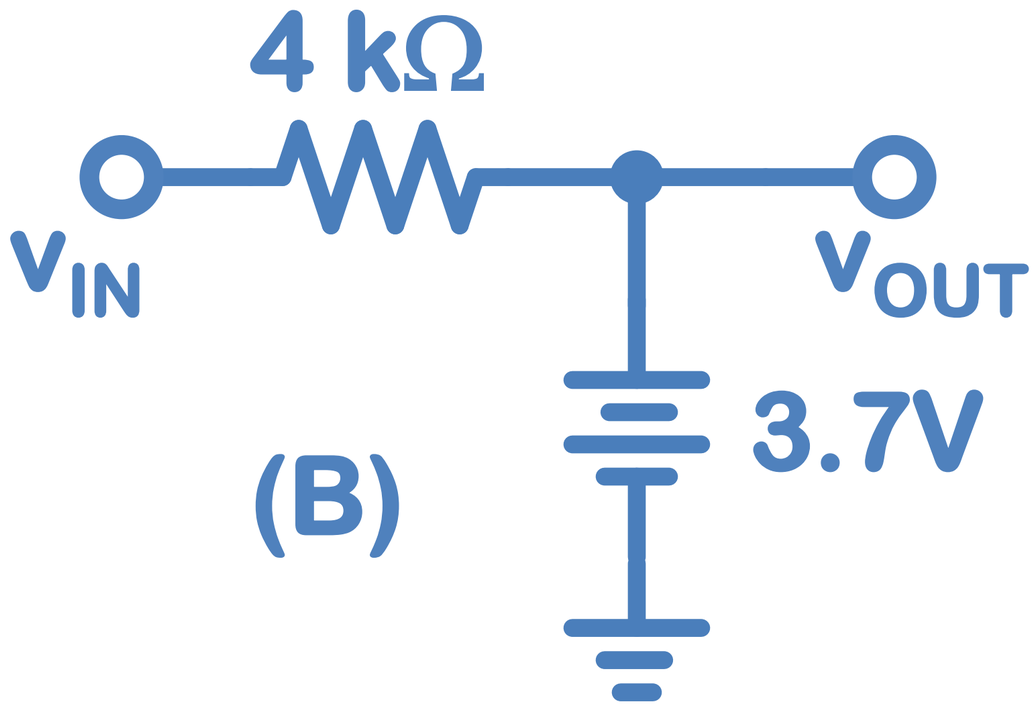
Voltage Divider

$v_{OUT}(v_{IN}) = (2k/(1k+2k))v_{IN}$

$v_{OUT}(v_{IN}) = (2/3)v_{IN}$

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





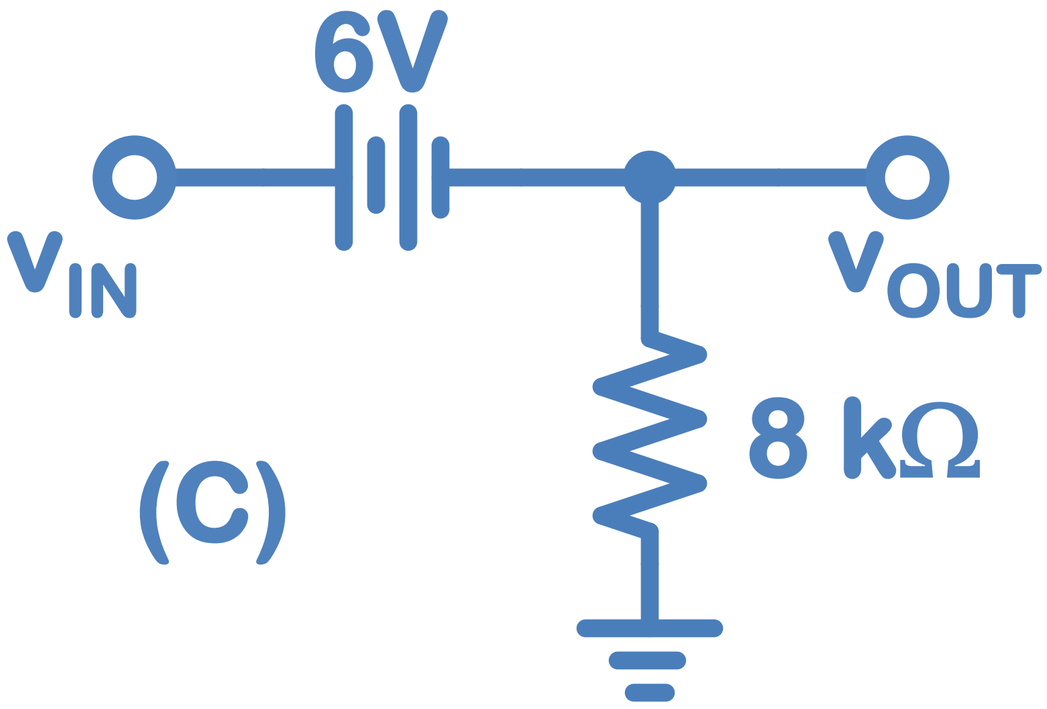
Tied to 3.7V

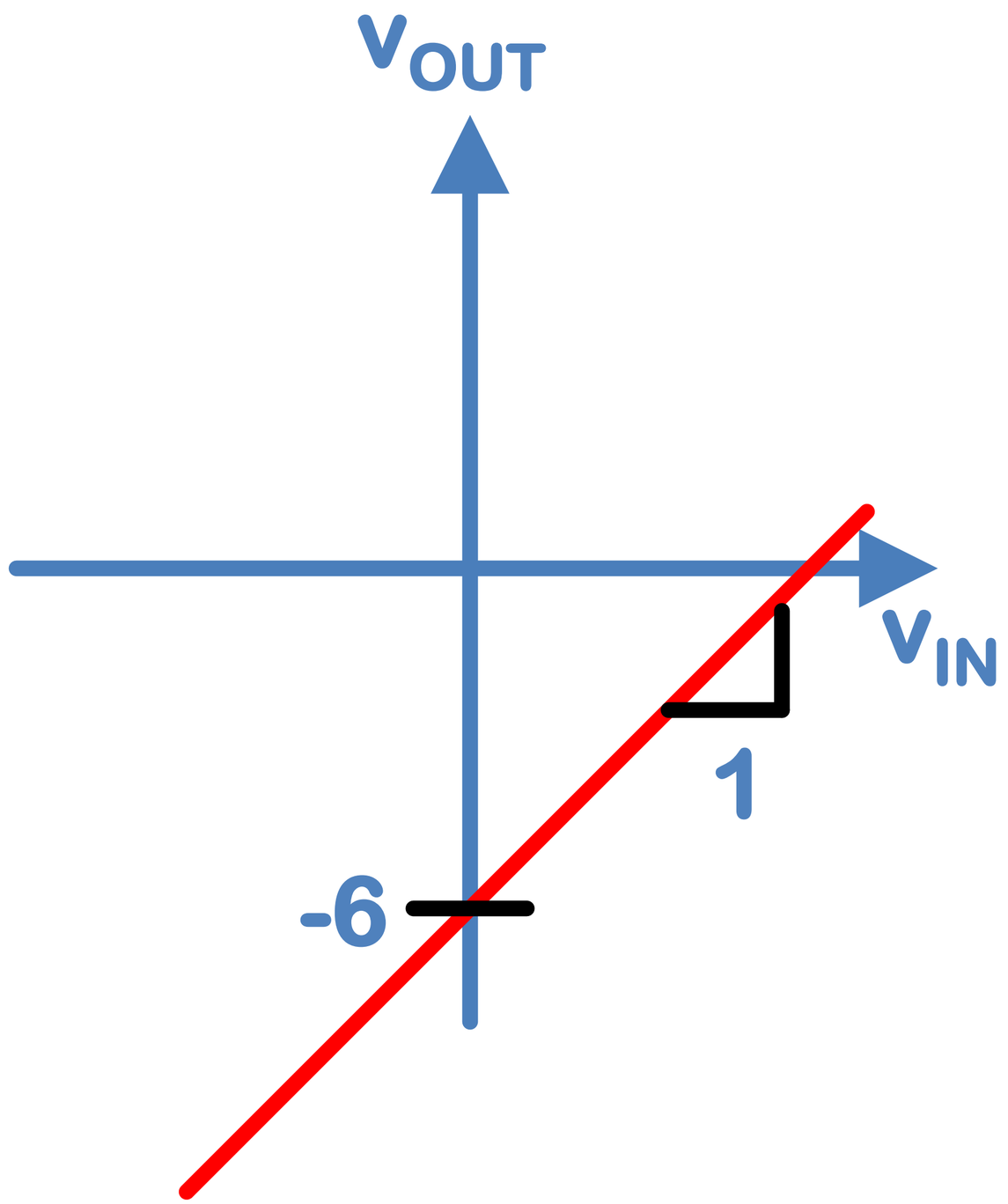
$v_{OUT}(v_{IN}) = 3.7$ [V]

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

Fixed offset from v_{IN}

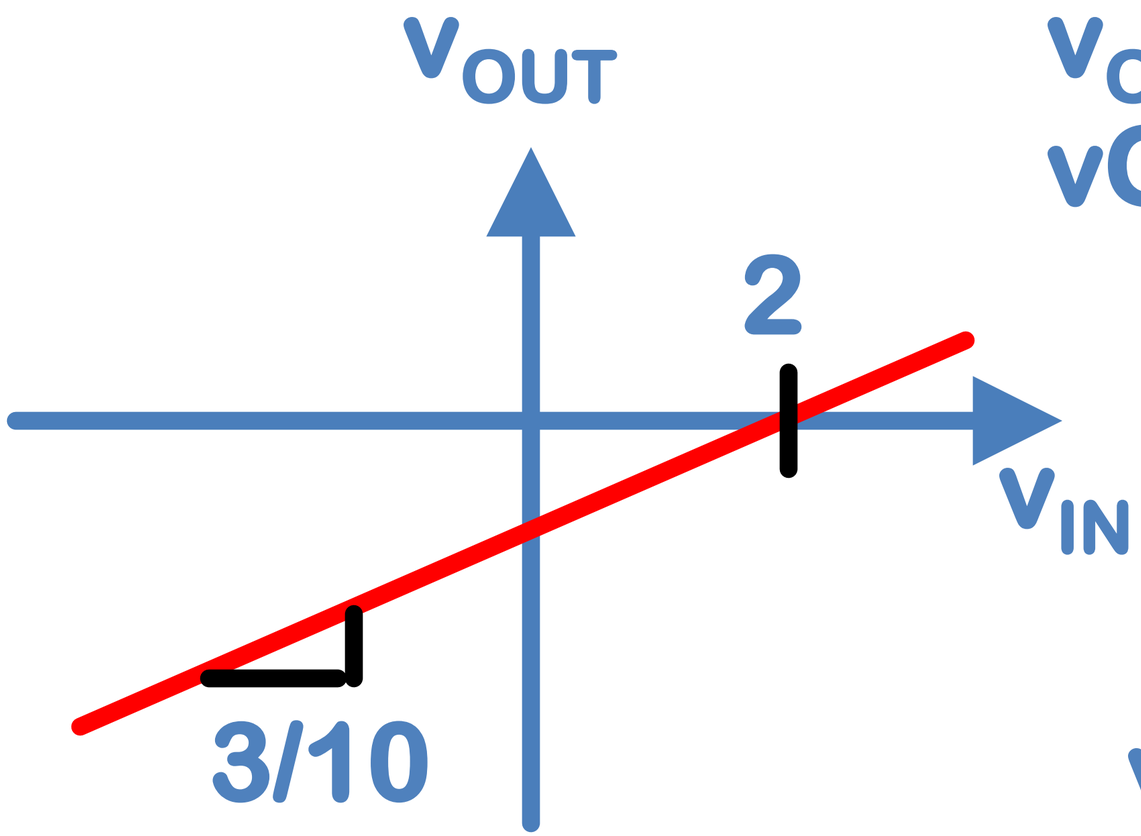
$v_{OUT}(v_{IN}) = v_{IN}-6$

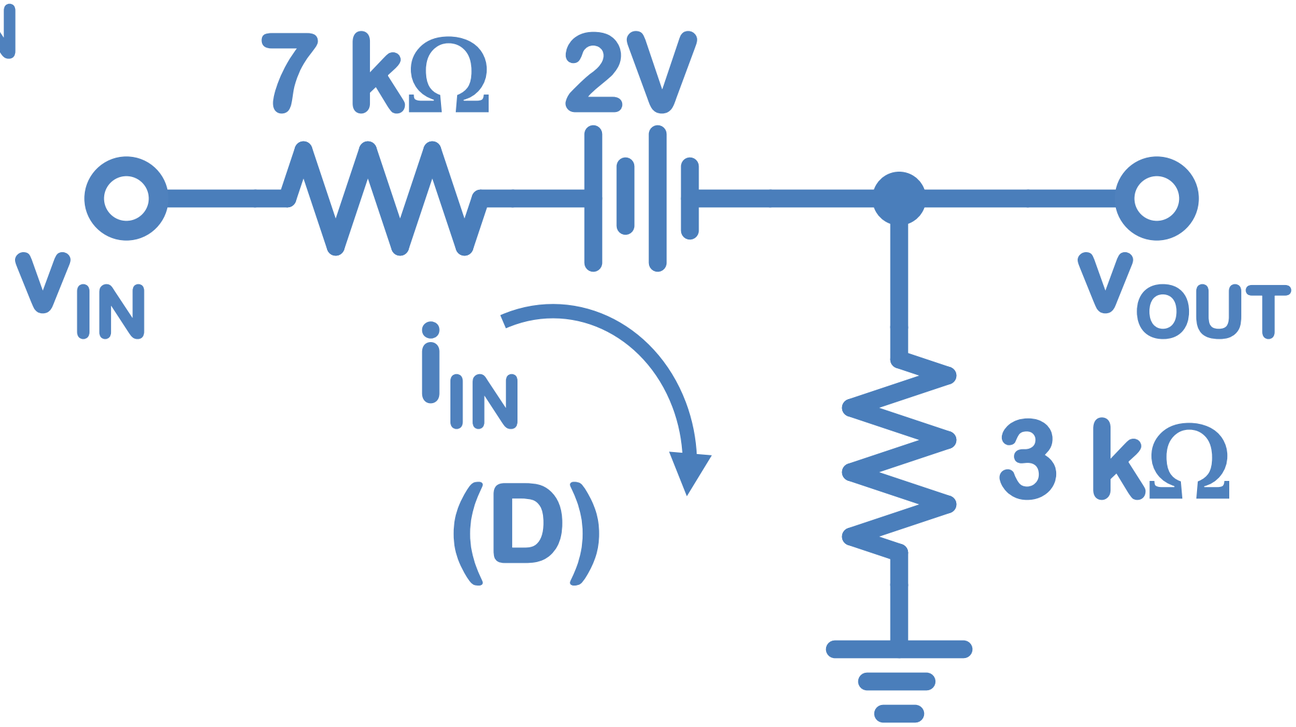




3) Find the equation and plot $v_{OUT}(v_{IN})$ for each circuit.

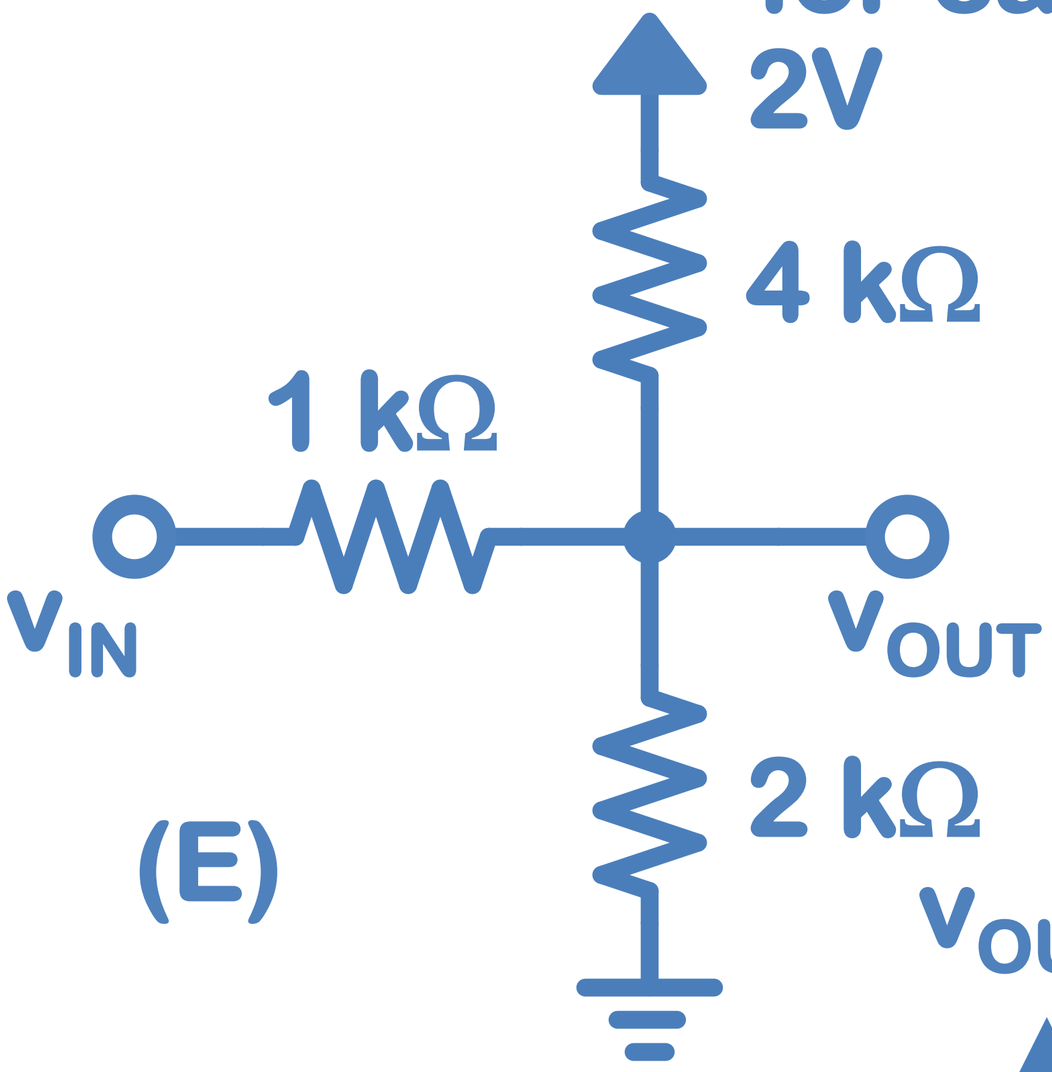
$$v_{IN}-7k*i_{IN}-2-3k*i_{IN} = 0$$
$$i_{IN} = (v_{IN}-2)/10k$$
$$v_{OUT} = i_{IN}*3k$$
$$vOUT = (3/10)(v_{IN}-2)$$





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

(E)



DC: Voltage Divider

$v_{OUT} = 2(1||2/(1||2+4))$

$v_{OUT} = 0.286$ [V]

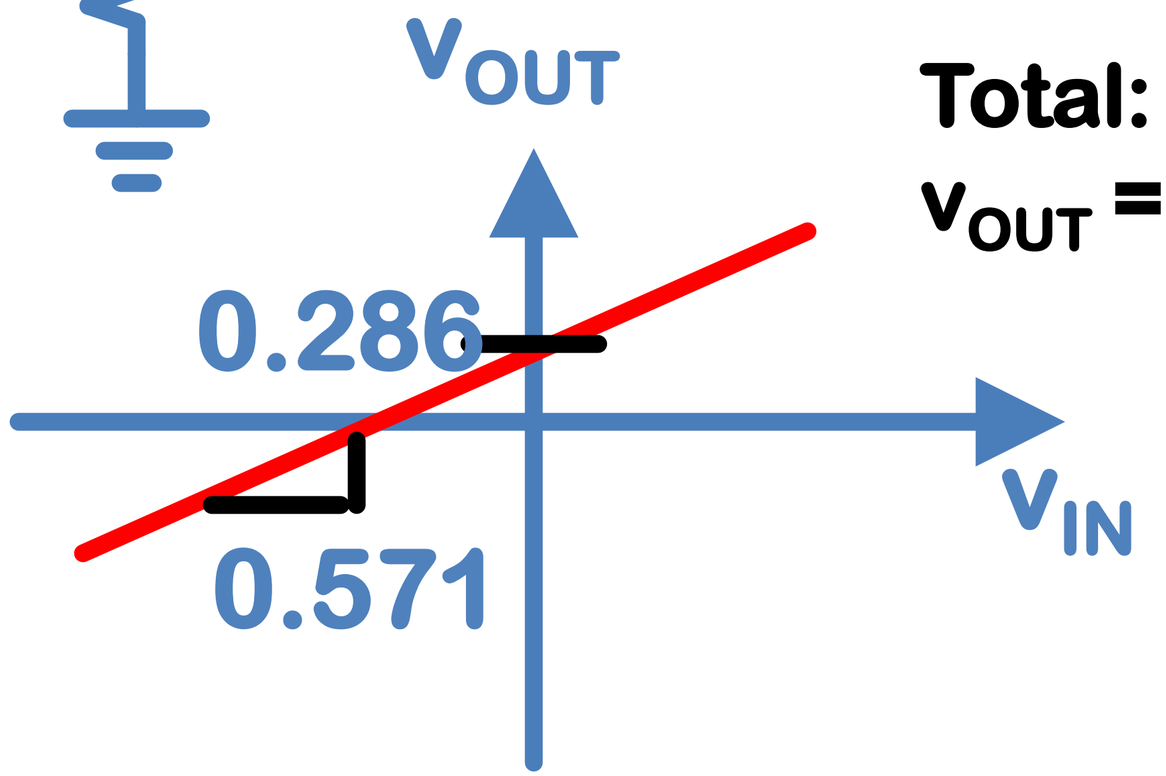
v_{IN}: Voltage Divider

$v_{OUT} = v_{IN}(2||4/(2||4+1))$

$v_{OUT} = 0.571v_{IN}$

Total:

$v_{OUT} = 0.571v_{IN} + 0.286$



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

DC: KCL at v_{OUT}

$(6-v_{OUT})/1k = (v_{OUT}+3)/1k + (v_{OUT}- -8)4k$

$v_{OUT} = (6/1 - 3/1 - 8/4)/(1/1 + 1/1 +1/4)$

$vOUT = 0.444[V]$

v_{IN}: Voltage Divider

$v_{OUT} = v_{IN}(1||4/(1||4+1))$

$v_{OUT} = 0.444v_{IN}$

Total:

$v_{OUT} = 0.444v_{IN} + 0.444$