

ECE 35, Fall 2017

Quiz 1- Section A

Last name

First + middle
name(s)

PID

Instructions:

- Read each problem completely and thoroughly before beginning
- All calculations need to be done on these sheets
- Write your answers in the answer boxes for each question. Make sure you list units!
- Answers without supporting calculations will receive zero credit

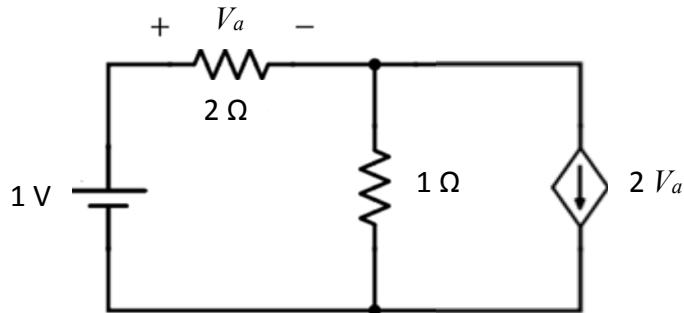
(1) In the circuit below, find the power received by each one of the four elements.

1V source

VCCS

1 Ω resistor

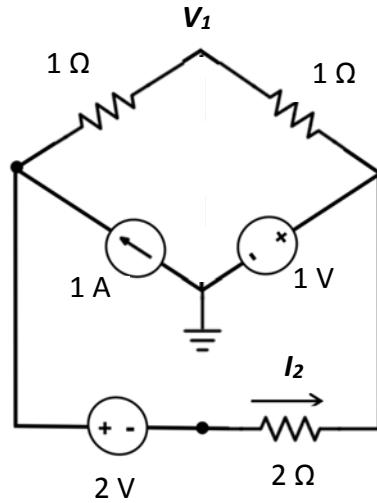
2 Ω resistor



(2) In the following circuit, find node voltage V_1 and current I_2 .

V_1

I_2



ECE 35, Fall 2017

Quiz 1- Section B

Last name

First + middle
name(s)

PID

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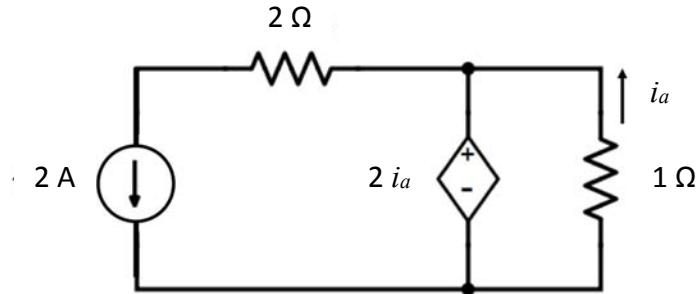
(1) In the circuit below, find the power received by each one of the four elements.

2A source

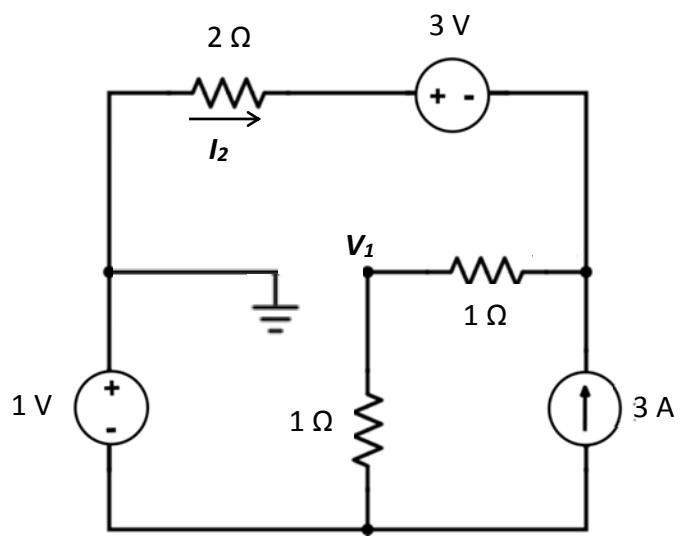
CCVS

1 Ω resistor

2 Ω resistor



(2) In the following circuit, find node voltage V_1 and current I_2 .



Quiz 1

/ 20

Last name

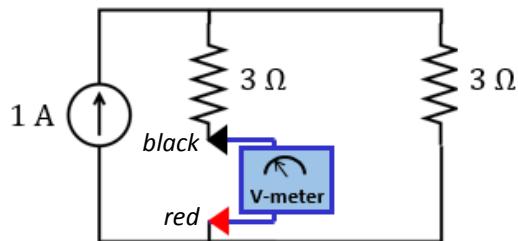
First + middle
name(s)

PID

Instructions:

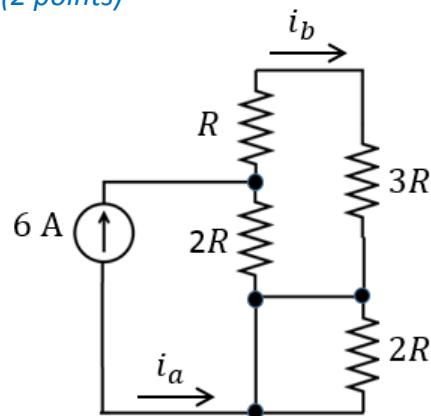
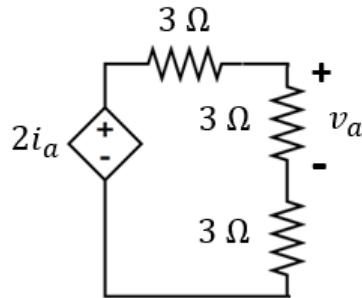
- Read each problem completely and thoroughly before beginning
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- Write your answers in the answer boxes for each question. Make sure you list units!
- Answers without supporting calculations will receive zero credit

(1) What is the reading of the volt meter? *(2 points)*



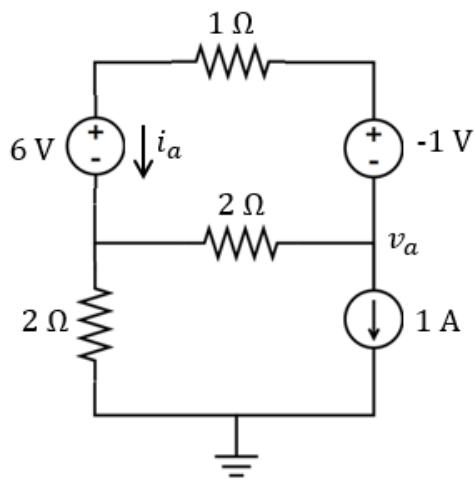
(2) (a) Find v_a and i_b . (2 + 2 points)

(b) Find the value of R such that the power supplied by the current source is 12 W. (2 points)



v_a	[]
i_b	[]
R	[]

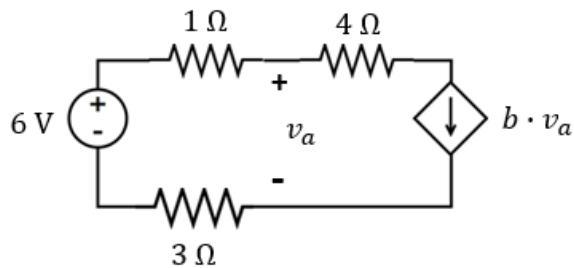
(3) Find i_a and node voltage v_a . (6 points)



i_a

v_a

- (4) (a) Assume $b = 0.5 \text{ A/V}$. Find v_a and the power received by the dependent source. *(2 + 2 points)*



i_a

Power received

- (b) Find the two (finite) values of b that make the power received by the dependent source be equal to 0. *(2 points)*

b

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(1) (3 points) In the problem below, both the volt-meter and the ammeter are ideal.

(a) What is the reading X of the volt-meter?

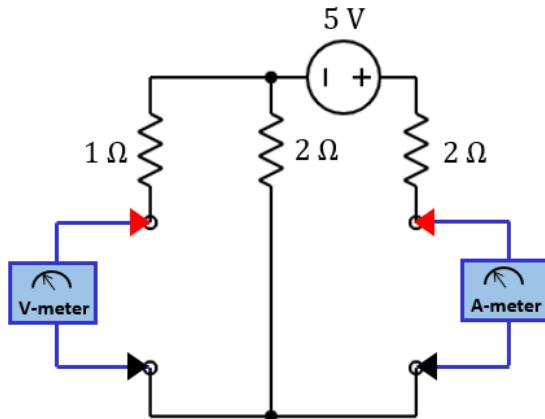
X

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(b) What is the power P_1 received by the ammeter?

P_1

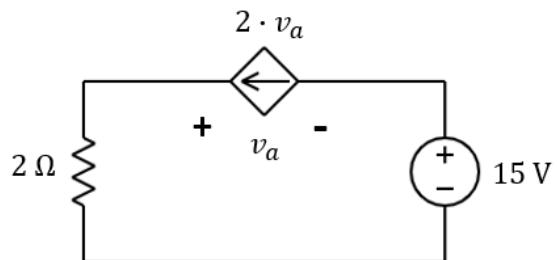
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(2) (3 points) Find v_a .

(The units of the dependent-current-source constant are A/V).

v_a



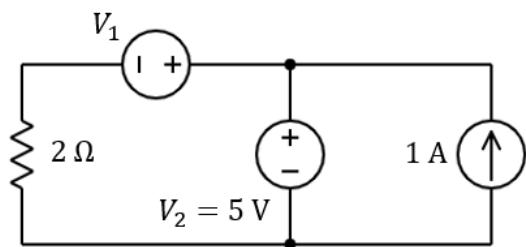
(3) (4 points) In the problem below, P_1 is the power supplied by the voltage source V_1 and P_2 is the power supplied by the voltage source V_2 . You are given that the sum of P_1 and P_2 is 3W.

(a) What is the power P_3 received by the current source?

P_3

(b) Find P_1 and P_2 .

P_1, P_2



Last name

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name(s)

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Instructions:

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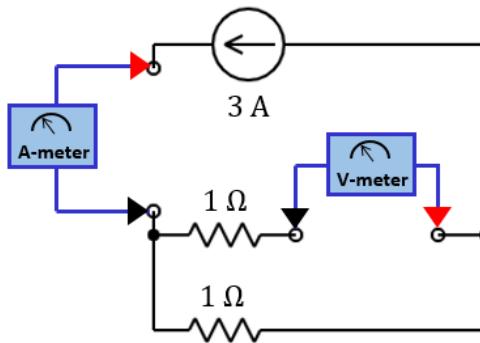
(1) (3 points) In the problem below, both the volt-meter and the ammeter are ideal.

(a) What is the reading X of the volt-meter?

X

(b) What is the power P_1 received by the ammeter?

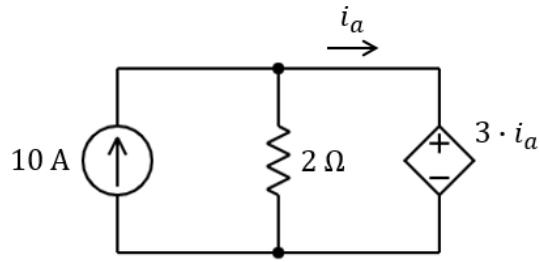
P_1



(2) (3 points) Find i_a .

(The units of the dependent-voltage-source constant are V/A).

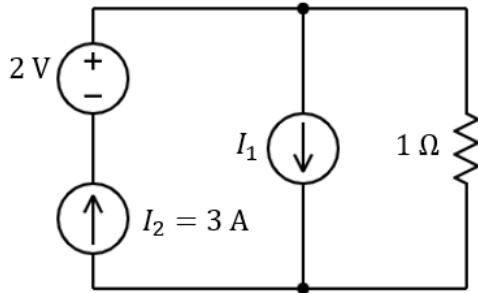
i_a



(3) (4 points) In the problem below, P_1 is the power supplied by the current source I_1 and P_2 is the power supplied by the current source I_2 . You are given that the sum of P_1 and P_2 is 3W.

(a) What is the power P_3 received by the voltage source? P_3

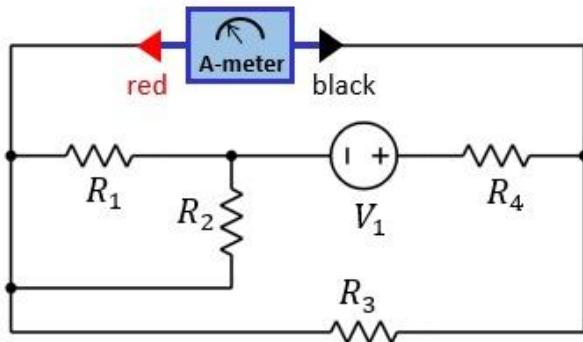
(b) Find P_1 and P_2 . P_1, P_2



Q1

In the problem below, the ammeter is ideal.

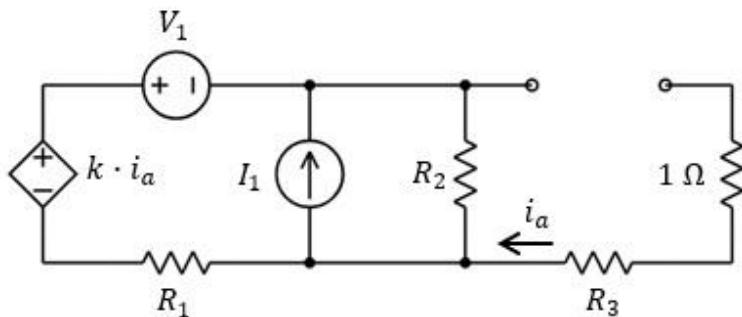
- What is the reading X of the ammeter?
- If we replace the ammeter by an ideal voltmeter (with red and black terminal in the same position), what is the reading Y of the voltmeter?



R1:	4Ω
R2:	4Ω
R3:	2Ω
R4:	2Ω
V1:	6 V

Q2

- What is the power P_1 supplied by the dependent source?
- What is the power P_2 supplied by the independent current source?

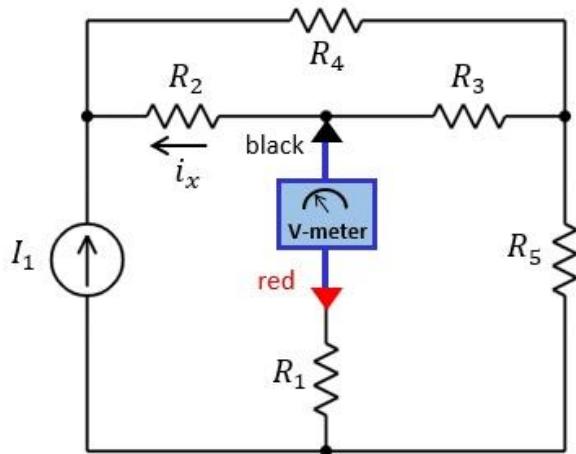


R1:	3Ω
R2:	1Ω
R3:	2Ω
V1:	1 V
I1:	1 A
k:	2 V/A

Q1

In the problem below, the voltmeter is ideal.

- What is the current i_x ?
- What is the reading X of the voltmeter?

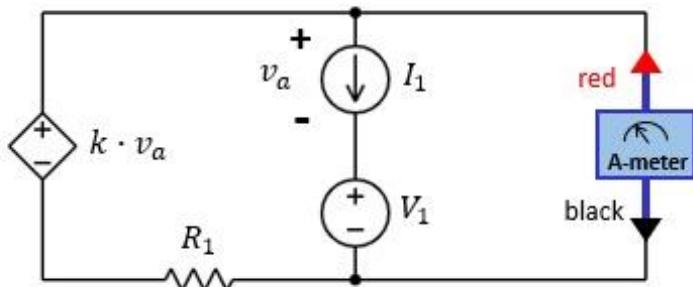


R1:	2 Ω
R2:	1 Ω
R3:	2 Ω
R4:	1 Ω
R5:	1 Ω
I1:	2 A

Q2

In the problem below, the ammeter is ideal.

- What is the power P_1 supplied by the independent voltage source?
- What is the power P_2 supplied by the dependent source?
- What is the reading X of the ammeter?



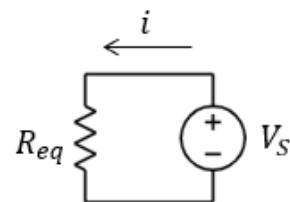
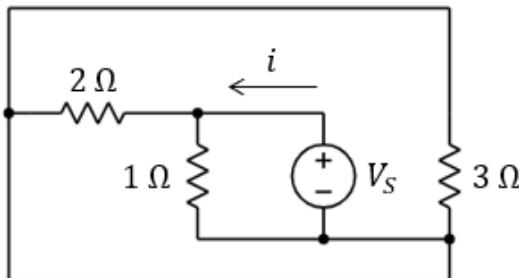
R1:	2 Ω
V1:	1 V
I1:	2 A
k:	2 V/V

Quiz 1

 / 13Last name First + middle
name(s) PID **Instructions:**

- Read each problem completely and thoroughly before beginning
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- (1) Find the equivalent resistance R_{eq} such that for the same V_s
the current i is the same in both circuits. (2 points)

 R_{eq} 

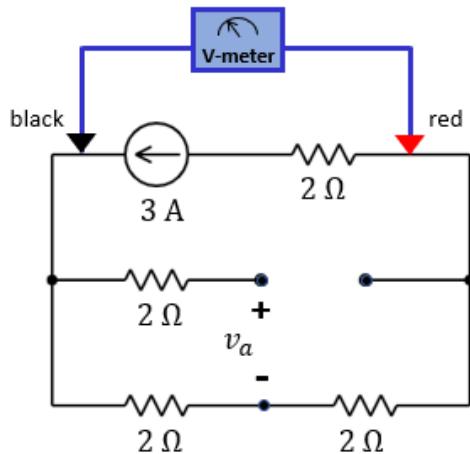
(2) In the problem below, the voltmeter is ideal.

(a) What is the reading X of the voltmeter? (2 points)

X

(b) What is the value of the voltage v_a ? (2 points)

v_a

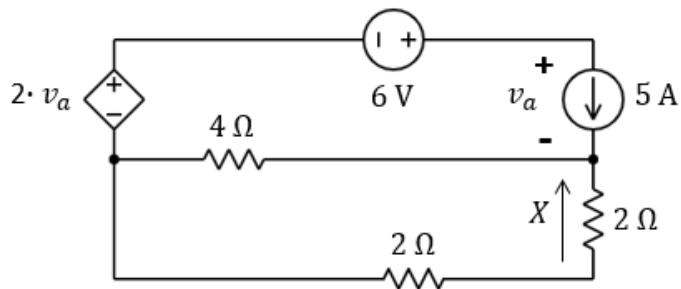


(3) (a) What is the power P_1 received by the independent voltage source? P_1
(1 point)

(b) What is the power P_2 received by the dependent voltage source? P_2
(2 points)

(c) What is the value of the current X ? X
(2 points)

(d) Redraw the circuit and include an (ideal) ammeter that allows you to measure the current X . Make sure you indicate where the red and black terminals are. *(2 points)*



ECE35 Equation Sheet

Basics: $i \triangleq \frac{dq}{dt}$ $v_{ab} \triangleq \frac{dw}{dq}$ $R = \rho \frac{l}{A}$

Capacitors: $C = \epsilon \cdot \frac{A}{d}$ $Q = C \cdot v$ $w_C = \frac{1}{2} C v^2$

Inductors: $L = \mu \cdot \frac{N^2 A}{l}$ $B \sim i$ $w_L = \frac{1}{2} L i^2$

AC power: $p(t) = \frac{1}{2} V_m I_m \cdot \cos(\theta_v - \theta_i) + \frac{1}{2} V_m I_m \cdot \cos(2\omega t + \theta_v + \theta_i)$

$$P = \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i) \quad Q = \frac{1}{2} V_m I_m \sin(\theta_v - \theta_i) \quad X_{rms} = \sqrt{\frac{1}{T} \int_0^T x(t)^2 dt}$$

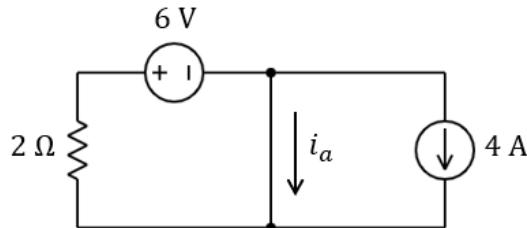
Trigonometry: $\sin(-\alpha) = -\sin(\alpha)$ $\cos(-\alpha) = \cos(\alpha)$ $\sin(\pi - \alpha) = \sin(\alpha)$ $\cos(\pi - \alpha) = -\cos(\alpha)$ $\sin\left(\frac{\pi}{2} - \alpha\right) = \cos(\alpha)$ $\cos\left(\frac{\pi}{2} - \alpha\right) = \sin(\alpha)$ $\sin\left(\alpha - \frac{\pi}{2}\right) = -\cos(\alpha)$ $\cos\left(\alpha - \frac{\pi}{2}\right) = \sin(\alpha)$ $\sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha)$ $\cos(2\alpha) = \cos^2(\alpha) - \sin^2(\alpha)$

$\sin(\alpha \pm \beta) = \sin(\alpha) \cos(\beta) \pm \cos(\alpha) \sin(\beta)$ $\cos(\alpha \pm \beta) = \cos(\alpha) \cos(\beta) \mp \sin(\alpha) \sin(\beta)$ $\sin(\alpha) \sin(\beta) = 0.5 \cdot (\cos(\alpha - \beta) - \cos(\alpha + \beta))$ $\cos(\alpha) \cos(\beta) = 0.5 \cdot (\cos(\alpha - \beta) + \cos(\alpha + \beta))$ $\sin(\alpha) \cos(\beta) = 0.5 \cdot (\sin(\alpha - \beta) + \sin(\alpha + \beta))$	$\alpha:$ 0 $\frac{\pi}{6}$ $\frac{\pi}{4}$ $\frac{\pi}{3}$ $\frac{\pi}{2}$ $\sin(\alpha):$ 0 $\frac{1}{2}$ $\frac{\sqrt{2}}{2}$ $\frac{\sqrt{3}}{2}$ 1 $\tan(\alpha):$ 0 $\frac{\sqrt{3}}{3}$ 1 $\sqrt{3}$ ∞
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Quiz 1

 / 12Your sequence number Last name First + middle
name(s) PID **Instructions:**

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(1) (a) What is the power P received by the voltage source? *(1 point)* P (b) What is current i_a ? *(1 point)* i_a 

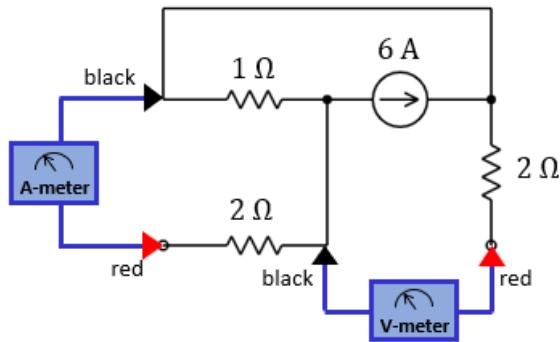
(2) In the problem below, the voltmeter and ammeter are ideal.

(a) What is the reading X of the voltmeter? (2 points)

X

(b) What is the reading Y of the ammeter? (2 points)

Y

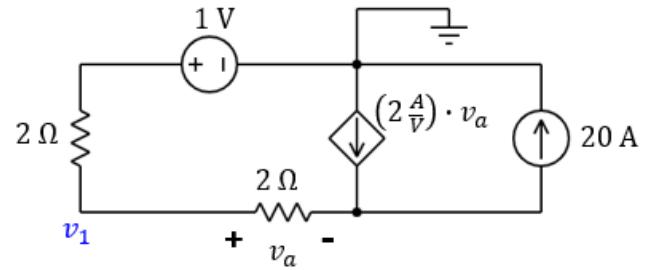
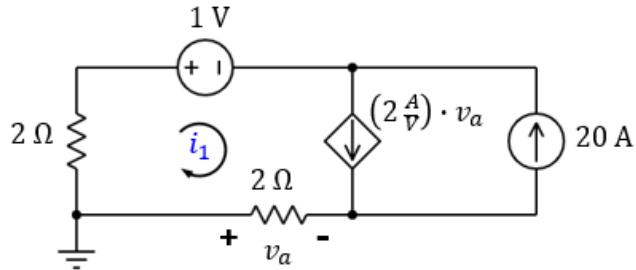


- (3) (a) Find the mesh current i_1 in the circuit on the left. You can use any analysis method. (4 points)

i_1

- (b) Find the node voltage v_1 in the circuit on the right. Note that this is the same circuit as the one on the left, just with the ground moved to a new location. (2 points)

v_1



ECE35 Equation Sheet

Basics: $i \triangleq \frac{dq}{dt}$ $v_{ab} \triangleq \frac{dw}{dq}$ $R = \rho \frac{l}{A}$

Capacitors: $C = \epsilon \cdot \frac{A}{d}$ $Q = C \cdot v$ $w_C = \frac{1}{2} C v^2$

Inductors: $L = \mu \cdot \frac{N^2 A}{l}$ $B \sim i$ $w_L = \frac{1}{2} L i^2$

AC power: $p(t) = \frac{1}{2} V_m I_m \cdot \cos(\theta_v - \theta_i) + \frac{1}{2} V_m I_m \cdot \cos(2\omega t + \theta_v + \theta_i)$

$$P = \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i) \quad Q = \frac{1}{2} V_m I_m \sin(\theta_v - \theta_i) \quad X_{rms} = \sqrt{\frac{1}{T} \int_0^T x(t)^2 dt}$$

Trigonometry: $\sin(-\alpha) = -\sin(\alpha)$ $\cos(-\alpha) = \cos(\alpha)$ $\sin(\pi - \alpha) = \sin(\alpha)$ $\cos(\pi - \alpha) = -\cos(\alpha)$ $\sin\left(\frac{\pi}{2} - \alpha\right) = \cos(\alpha)$ $\cos\left(\frac{\pi}{2} - \alpha\right) = \sin(\alpha)$ $\sin\left(\alpha - \frac{\pi}{2}\right) = -\cos(\alpha)$ $\cos\left(\alpha - \frac{\pi}{2}\right) = \sin(\alpha)$ $\sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha)$ $\cos(2\alpha) = \cos^2(\alpha) - \sin^2(\alpha)$

$\sin(\alpha \pm \beta) = \sin(\alpha) \cos(\beta) \pm \cos(\alpha) \sin(\beta)$ $\cos(\alpha \pm \beta) = \cos(\alpha) \cos(\beta) \mp \sin(\alpha) \sin(\beta)$ $\sin(\alpha) \sin(\beta) = 0.5 \cdot (\cos(\alpha - \beta) - \cos(\alpha + \beta))$ $\cos(\alpha) \cos(\beta) = 0.5 \cdot (\cos(\alpha - \beta) + \cos(\alpha + \beta))$ $\sin(\alpha) \cos(\beta) = 0.5 \cdot (\sin(\alpha - \beta) + \sin(\alpha + \beta))$	$\alpha:$ 0 $\frac{\pi}{6}$ $\frac{\pi}{4}$ $\frac{\pi}{3}$ $\frac{\pi}{2}$ $\sin(\alpha):$ 0 $\frac{1}{2}$ $\frac{\sqrt{2}}{2}$ $\frac{\sqrt{3}}{2}$ 1 $\tan(\alpha):$ 0 $\frac{\sqrt{3}}{3}$ 1 $\sqrt{3}$ ∞
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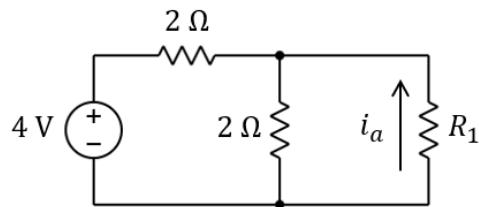
Quiz 1

/ 12

Your sequence number Last name First + middle
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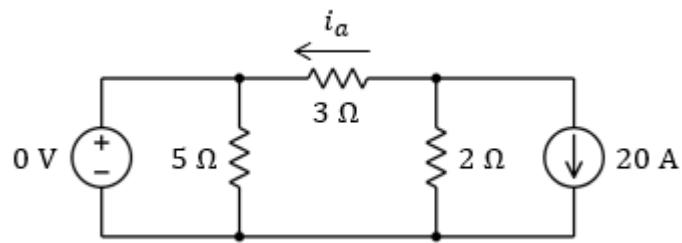
- Read each problem completely and thoroughly before beginning
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- Answers without supporting calculations will receive zero credit

(1) (*1 point*) How can you connect an ammeter to measure i_a , which is the current through resistor R_1 ? Redraw the circuit so that it shows how to connect the ammeter. Do not forget to indicate the red and black terminals.



(2) (2 points) What is the current i_a ?

$$i_a \boxed{\hspace{1cm}}$$



(3) (4 points) In the problem below, the voltmeter is ideal.

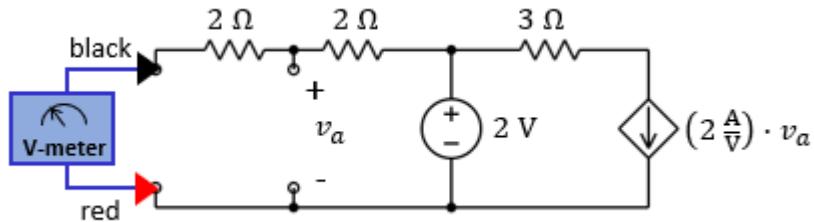
(a) What is the reading X of the voltmeter?

 X

(b) What is the power P_1 supplied by the independent source?

 P_1

(c) What is the power P_2 supplied by the dependent source?

 P_2 

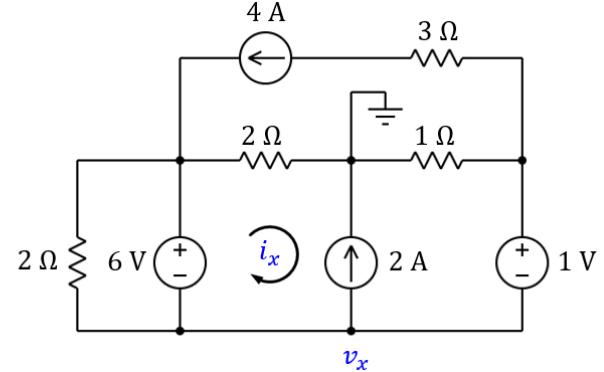
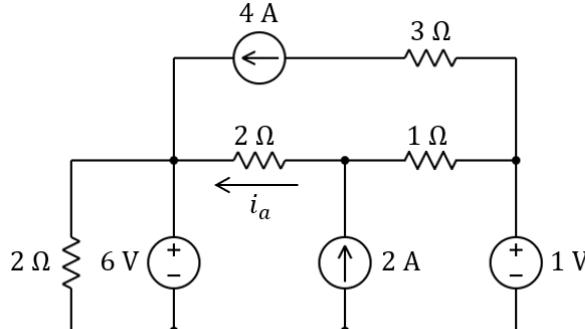
- (4) (5 points) For this problem, you can use any analysis method you like. To maximize your opportunity for partial credit, lay out your equations first before solving.
 Hint: Think carefully about your analysis method.

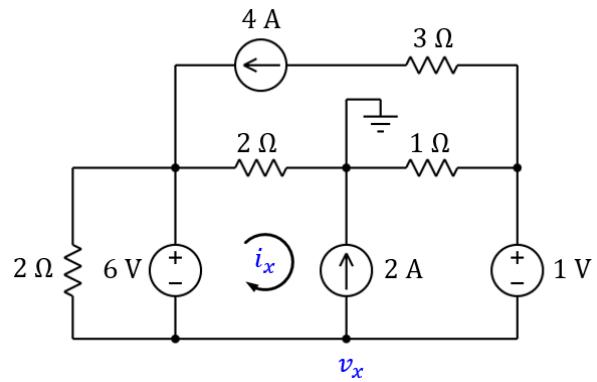
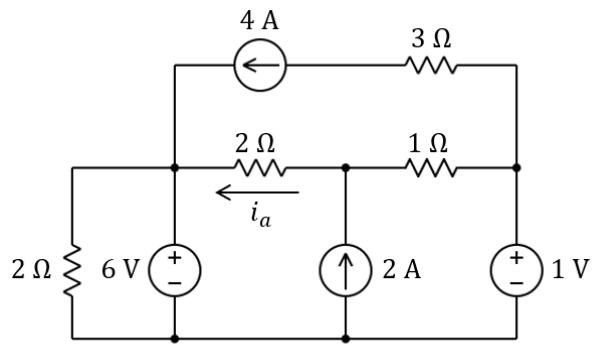
(a) What is the current i_a in the circuit on the left?

(b) What is the node voltage v_x in the circuit on the right?

This is the same circuit as the one on the left, just with the ground added.

(c) What is the mesh current i_x in the circuit on the right?





ECE35 Equation Sheet

Basics: $i \triangleq \frac{dq}{dt}$ $v_{ab} \triangleq \frac{dw}{dq}$ $R = \rho \frac{l}{A}$

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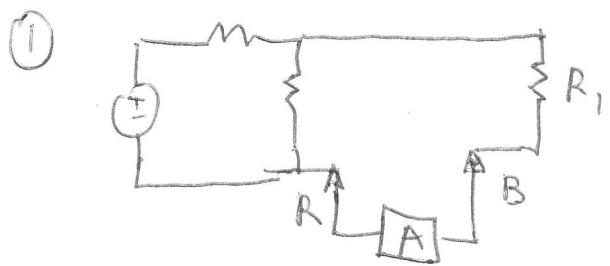
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$$P = \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i) \quad Q = \frac{1}{2} V_m I_m \sin(\theta_v - \theta_i) \quad X_{rms} = \sqrt{\frac{1}{T} \int_0^T x(t)^2 dt}$$

Trigonometry: $\sin(-\alpha) = -\sin(\alpha)$ $\cos(-\alpha) = \cos(\alpha)$ $\sin(\pi - \alpha) = \sin(\alpha)$ $\cos(\pi - \alpha) = -\cos(\alpha)$ $\sin\left(\frac{\pi}{2} - \alpha\right) = \cos(\alpha)$ $\cos\left(\frac{\pi}{2} - \alpha\right) = \sin(\alpha)$ $\sin\left(\alpha - \frac{\pi}{2}\right) = -\cos(\alpha)$ $\cos\left(\alpha - \frac{\pi}{2}\right) = \sin(\alpha)$ $\sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha)$ $\cos(2\alpha) = \cos^2(\alpha) - \sin^2(\alpha)$

$\sin(\alpha \pm \beta) = \sin(\alpha) \cos(\beta) \pm \cos(\alpha) \sin(\beta)$ $\cos(\alpha \pm \beta) = \cos(\alpha) \cos(\beta) \mp \sin(\alpha) \sin(\beta)$ $\sin(\alpha) \sin(\beta) = 0.5 \cdot (\cos(\alpha - \beta) - \cos(\alpha + \beta))$ $\cos(\alpha) \cos(\beta) = 0.5 \cdot (\cos(\alpha - \beta) + \cos(\alpha + \beta))$ $\sin(\alpha) \cos(\beta) = 0.5 \cdot (\sin(\alpha - \beta) + \sin(\alpha + \beta))$	$\alpha:$ 0 $\frac{\pi}{6}$ $\frac{\pi}{4}$ $\frac{\pi}{3}$ $\frac{\pi}{2}$ $\sin(\alpha):$ 0 $\frac{1}{2}$ $\frac{\sqrt{2}}{2}$ $\frac{\sqrt{3}}{2}$ 1 $\tan(\alpha):$ 0 $\frac{\sqrt{3}}{3}$ 1 $\sqrt{3}$ ∞
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② $i_a = -8A$

③ ④ $X = -2V$

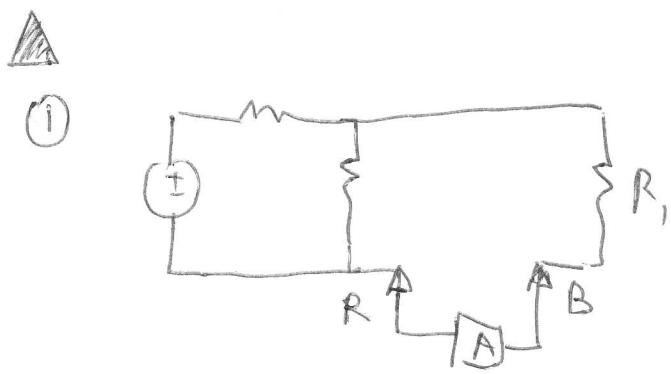
⑤ $P_1 = 8W$

⑥ $P_2 = 40W$

⑦ ⑧ $i_a = -1A$

⑨ $v_x = -4V$

⑩ $i_x = -3A$



② $i_a = \cancel{12A} - 6A$

③ ④ $X = -2V$

⑤ $P_1 = 12W$

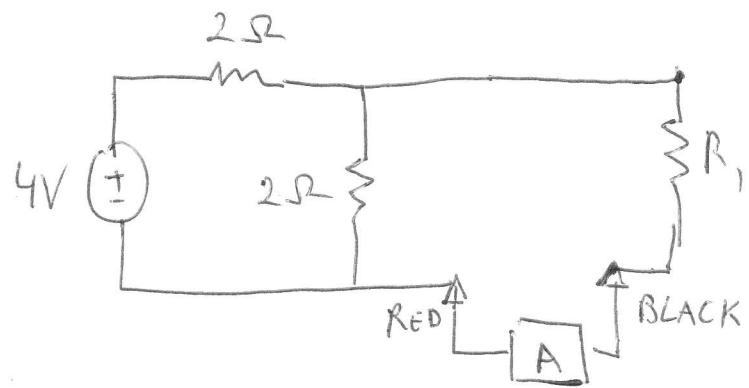
⑥ $P_2 = 60W$

⑦ ⑧ $i_a = -1A$

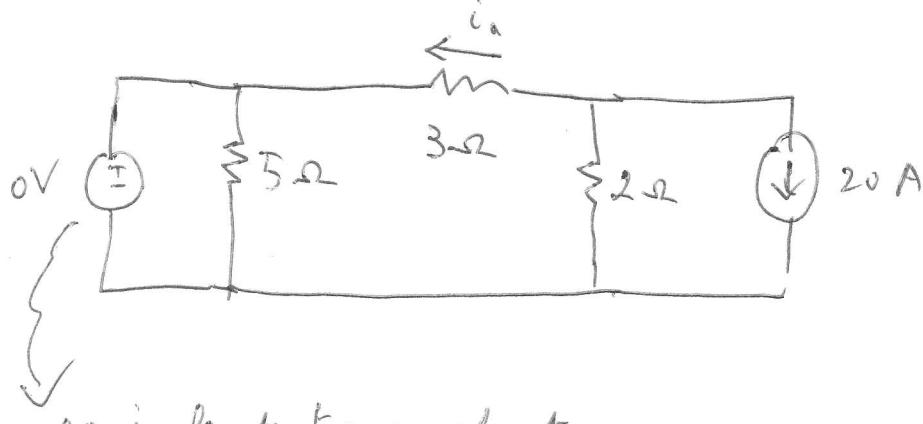
⑨ $v_x = -3V$

⑩ $i_x = -4A$

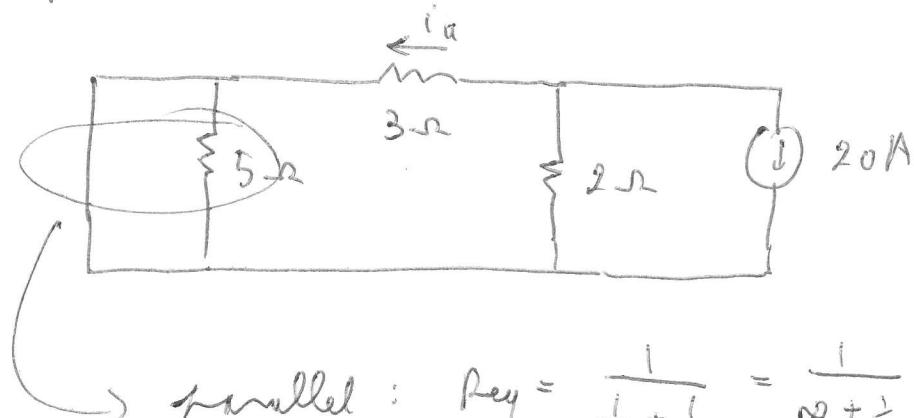
①



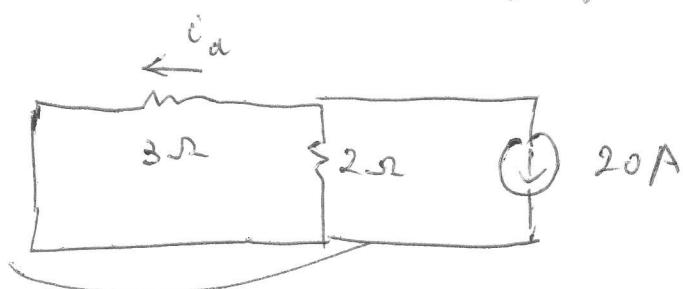
(2)



equivalent to a short



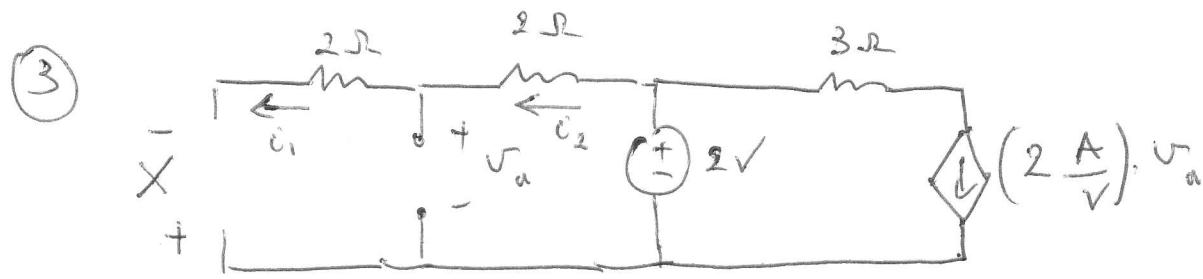
$$\rightarrow \text{parallel: } R_{\text{eq}} = \frac{1}{\frac{1}{3} + \frac{1}{5}} = \frac{1}{\frac{5}{15} + \frac{3}{15}} = \frac{1}{\frac{8}{15}} = \frac{15}{8} = 0$$



\hookrightarrow current divider

$$i_a = (-20) \cdot \frac{2}{2+3} = -8 \text{ A}$$

$i_a = -8 \text{ A}$



$$i_1 = 0 \text{ A} \quad i_2 = 0 \text{ A}$$

④ $\Rightarrow v_a = 2V \Rightarrow \boxed{X = -2V}$



$$2V \downarrow -4A \quad P = 2(-4) = -8W \text{ received}$$

$\boxed{P_1 = 8W}$ supplied

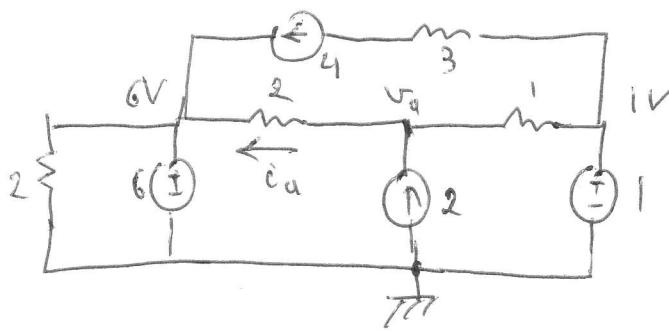
⑥ $v_1 = 3\Omega \cdot 4A = 12V$

KVL: $-2 + v_1 + v_2 = 0 \Rightarrow v_2 = 2 - v_1 = -10V$

Circuit diagram for part ⑥. A dependent current source $4A \downarrow$ and a dependent voltage source $-10V$. The voltage across the 3Ω resistor is $-10V$. The power supplied by the dependent voltage source is $P_2 = 4 \cdot (-10) = -40W$ received.

$\boxed{P_2 = 40W}$ supplied

(4) (a)



nodal analysis:

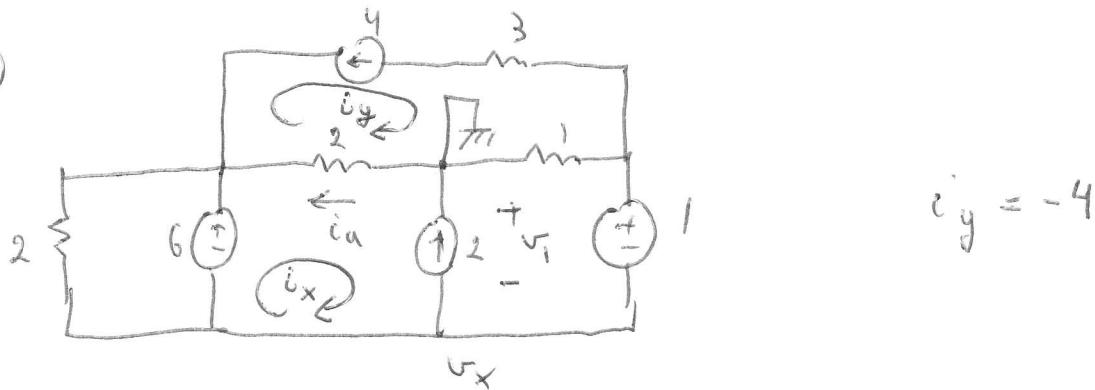
$$\frac{v_a - 6}{2} + \frac{v_a - 1}{1} - 2 = 0 \Rightarrow v_a - 6 + 2(v_a - 1) - 4 = 0$$

$$3v_a - 12 = 0$$

$$v_a = 4V$$

$$i_a = \frac{v_a - 6}{2} = \frac{4 - 6}{2} = -1 \quad \boxed{i_a = -1A}$$

(b) (c)



* i_a is the same

consider mesh currents i_x and i_y :

$$i_a = i_y - i_x = -1$$

$$\Rightarrow i_x = i_y - i_a = -4 - (-1) = -3$$

$$\boxed{i_x = -3A}$$

* v_x is the same

$$v_x = v_a - 0 = 4 \Rightarrow v_x = 0 - v_x = 4$$

$$\boxed{v_x = -4V}$$

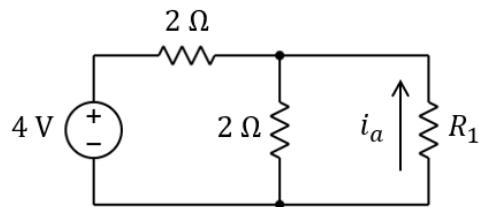
Quiz 1

/ 12

Your sequence number Last name First + middle
name(s) PID **Instructions:**

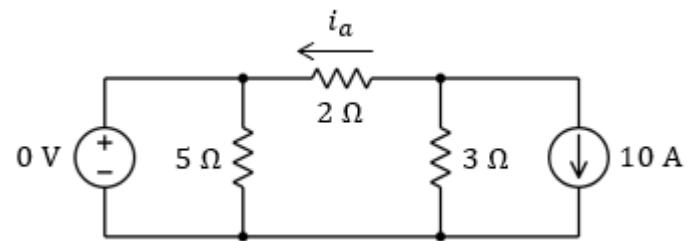
- Read each problem completely and thoroughly before beginning
- All calculations need to be done on these sheets
- Write your answers in the answer boxes for each question. Make sure you list units!
- Answers without supporting calculations will receive zero credit

(1) (*1 point*) How can you connect an ammeter to measure i_a , which is the current through resistor R_1 ? Redraw the circuit so that it shows how to connect the ammeter. Do not forget to indicate the red and black terminals.



(2) (2 points) What is the current i_a ?

i_a



(3) (4 points) In the problem below, the voltmeter is ideal.

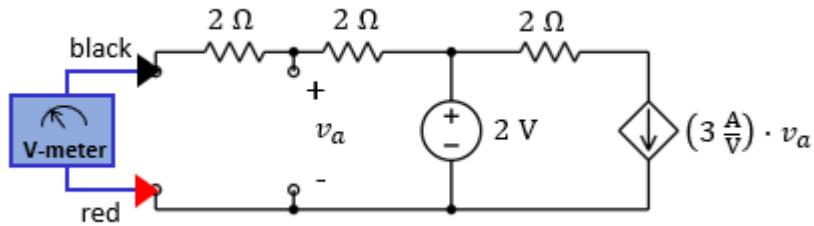
(a) What is the reading X of the voltmeter?

 X

(b) What is the power P_1 supplied by the independent source?

 P_1

(c) What is the power P_2 supplied by the dependent source?

 P_2 

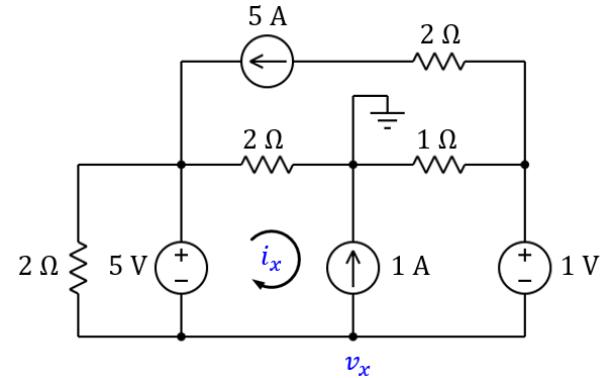
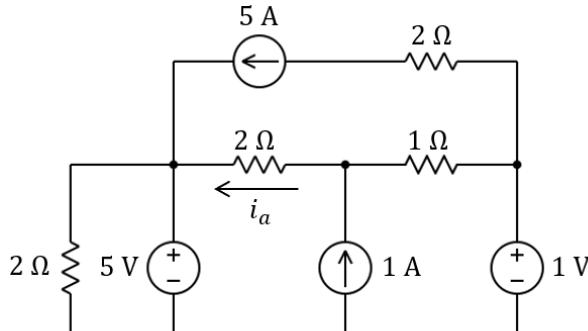
- (4) (5 points) For this problem, you can use any analysis method you like. To maximize your opportunity for partial credit, lay out your equations first before solving.
 Hint: Think carefully about your analysis method.

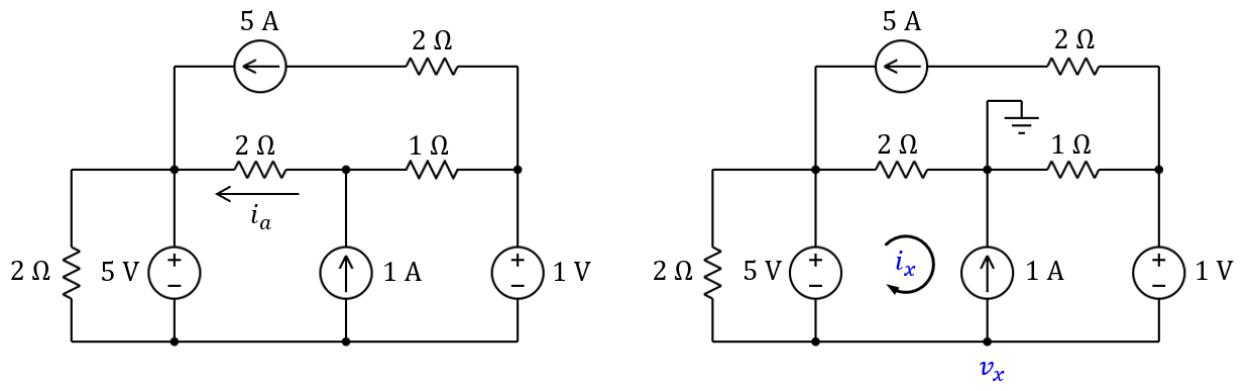
(a) What is the current i_a in the circuit on the left?

(b) What is the node voltage v_x in the circuit on the right?

This is the same circuit as the one on the left, just with the ground added.

(c) What is the mesh current i_x in the circuit on the right?





ECE35 Equation Sheet

Basics: $i \triangleq \frac{dq}{dt}$ $v_{ab} \triangleq \frac{dw}{dq}$ $R = \rho \frac{l}{A}$

Capacitors: $C = \epsilon \cdot \frac{A}{d}$ $Q = C \cdot v$ $w_C = \frac{1}{2} C v^2$

Inductors: $L = \mu \cdot \frac{N^2 A}{l}$ $B \sim i$ $w_L = \frac{1}{2} L i^2$

AC power: $p(t) = \frac{1}{2} V_m I_m \cdot \cos(\theta_v - \theta_i) + \frac{1}{2} V_m I_m \cdot \cos(2\omega t + \theta_v + \theta_i)$

$$P = \frac{1}{2} V_m I_m \cos(\theta_v - \theta_i) \quad Q = \frac{1}{2} V_m I_m \sin(\theta_v - \theta_i) \quad X_{rms} = \sqrt{\frac{1}{T} \int_0^T x(t)^2 dt}$$

Trigonometry: $\sin(-\alpha) = -\sin(\alpha)$ $\cos(-\alpha) = \cos(\alpha)$ $\sin(\pi - \alpha) = \sin(\alpha)$ $\cos(\pi - \alpha) = -\cos(\alpha)$ $\sin\left(\frac{\pi}{2} - \alpha\right) = \cos(\alpha)$ $\cos\left(\frac{\pi}{2} - \alpha\right) = \sin(\alpha)$ $\sin\left(\alpha - \frac{\pi}{2}\right) = -\cos(\alpha)$ $\cos\left(\alpha - \frac{\pi}{2}\right) = \sin(\alpha)$ $\sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha)$ $\cos(2\alpha) = \cos^2(\alpha) - \sin^2(\alpha)$

$\sin(\alpha \pm \beta) = \sin(\alpha) \cos(\beta) \pm \cos(\alpha) \sin(\beta)$ $\cos(\alpha \pm \beta) = \cos(\alpha) \cos(\beta) \mp \sin(\alpha) \sin(\beta)$ $\sin(\alpha) \sin(\beta) = 0.5 \cdot (\cos(\alpha - \beta) - \cos(\alpha + \beta))$ $\cos(\alpha) \cos(\beta) = 0.5 \cdot (\cos(\alpha - \beta) + \cos(\alpha + \beta))$ $\sin(\alpha) \cos(\beta) = 0.5 \cdot (\sin(\alpha - \beta) + \sin(\alpha + \beta))$	$\alpha:$ 0 $\frac{\pi}{6}$ $\frac{\pi}{4}$ $\frac{\pi}{3}$ $\frac{\pi}{2}$ $\sin(\alpha):$ 0 $\frac{1}{2}$ $\frac{\sqrt{2}}{2}$ $\frac{\sqrt{3}}{2}$ 1 $\tan(\alpha):$ 0 $\frac{\sqrt{3}}{3}$ 1 $\sqrt{3}$ ∞
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ECE 35, Spring 2020

Quiz 1

/ 10

Last name

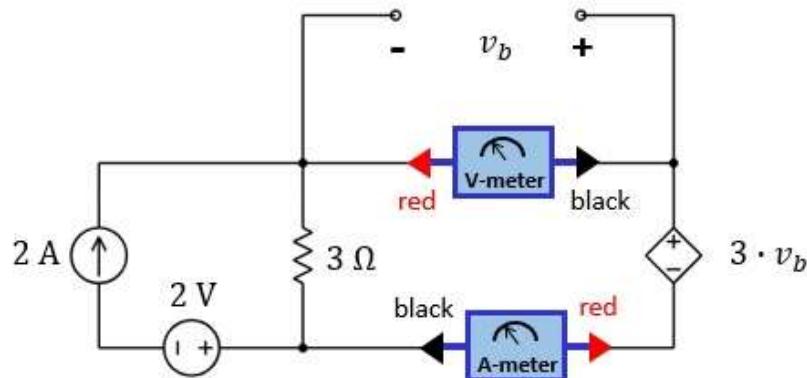
First + middle
name(s)

PID

(1) (5 points)

In the problem below, both the volt meter and the ammeter are ideal.

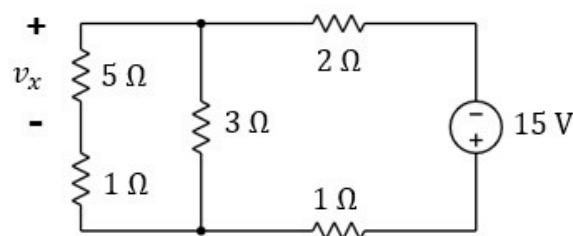
- (a) What is the reading X of the ammeter?
- (b) What is the reading Y of the volt meter?
- (c) What is the power P_1 supplied by the current source?



(2) (5 points)

Consider the circuit below.

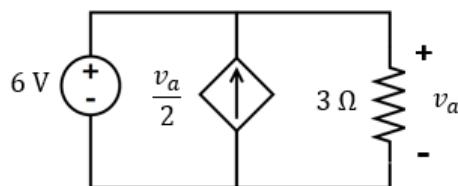
- (a) Find v_x .
- (b) What is the total power P_1 received by all resistors combined?
- (c) If we flip the direction of the voltage source, what is the power P_2 received by resistor R_1 ?



Quiz 1

 / 12Last name
First + middle
name(s)
PID
Instructions:

- Read each problem completely and thoroughly before beginning
- All calculations need to be done on these sheets
- Write your answers in the answer boxes for each question. Make sure you list units!
- Answers without supporting calculations will receive zero credit

(1) (a) What is the power P_1 supplied by the dependent source? *(2 points)* P_1
(b) What is the power P_2 supplied by the voltage source? *(2 points)* P_2


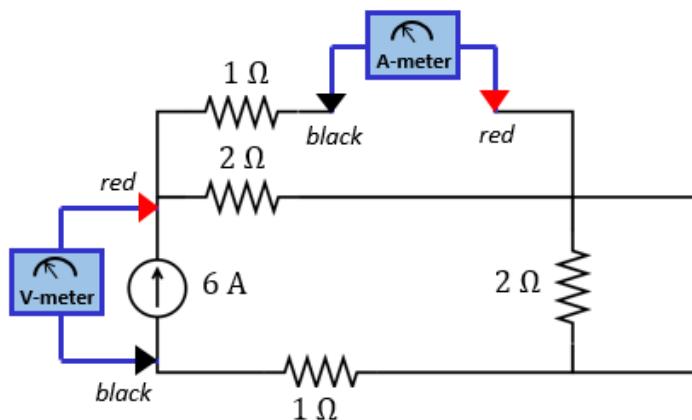
(2) In the problem below, both the volt-meter and the ammeter are ideal.

(a) What is the reading X of the ammeter? (2 points)

X

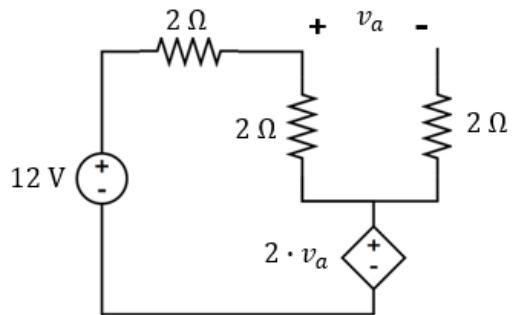
(b) What is the reading Y of the volt-meter? (2 points)

Y



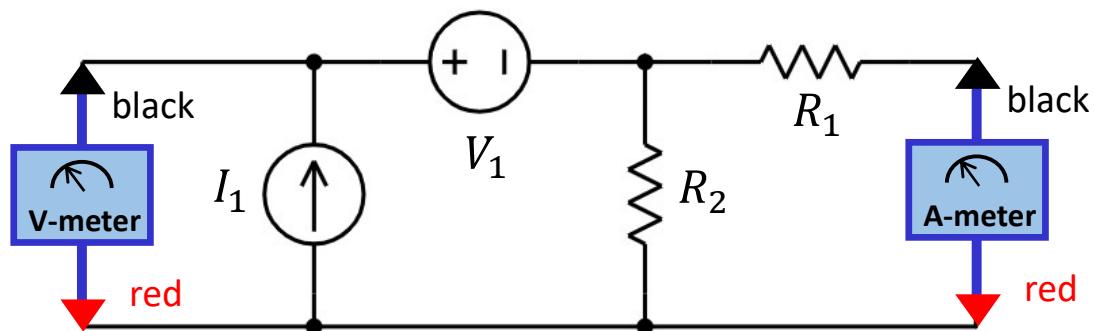
(3) Find v_a . (4 points)

v_a



In the problem below, the ammeter is ideal.

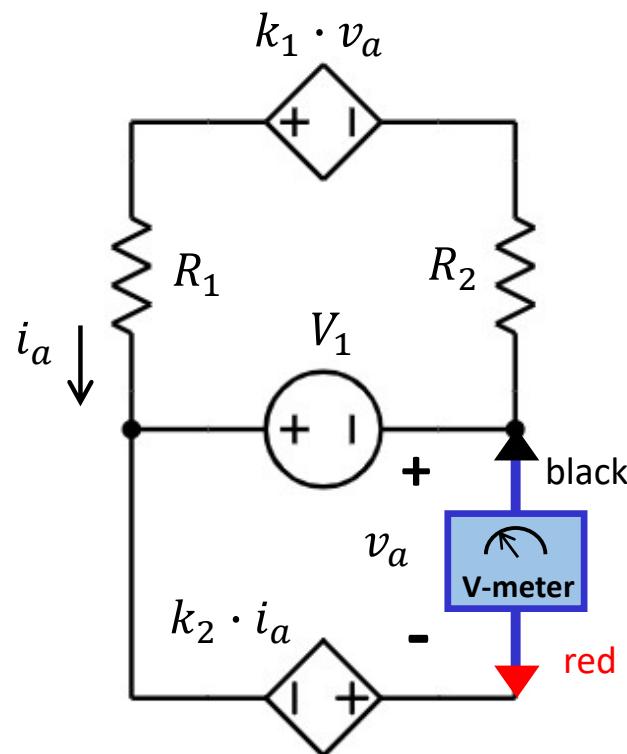
- What is the reading X of the ammeter?
- What is the reading Y of the voltmeter?



R1:	2 Ω
R2:	2 Ω
V1:	2 V
I1:	0 A

In the problem below, the voltmeter is ideal.

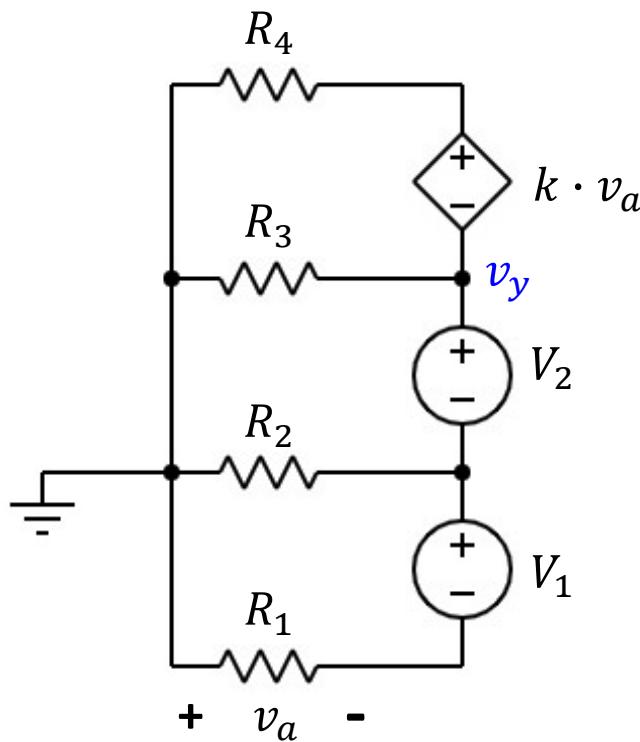
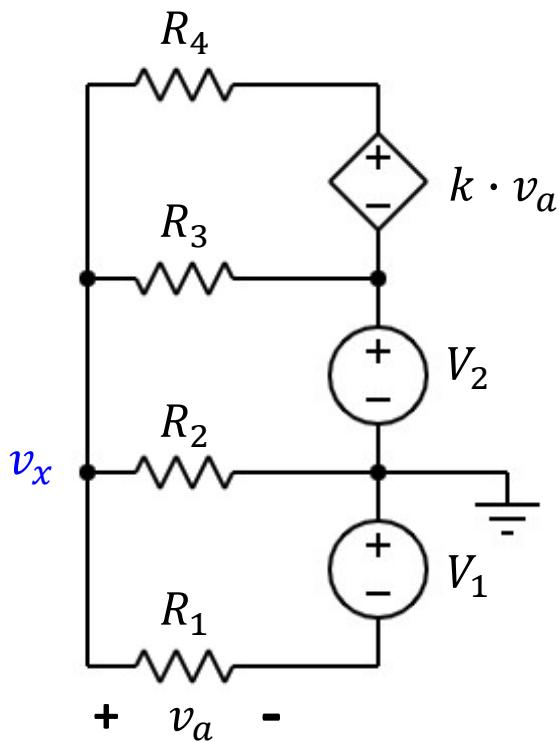
- What is the reading X of the voltmeter?
- What is the power P received by the voltage-controlled voltage source?



R1:	2Ω
R2:	0Ω
V1:	5 V
k1:	1 V/V
k2:	3 V/A

Consider the circuits below. They have the exact same components; only the position of ground is different.

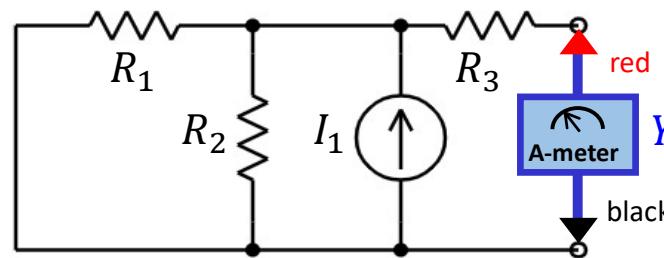
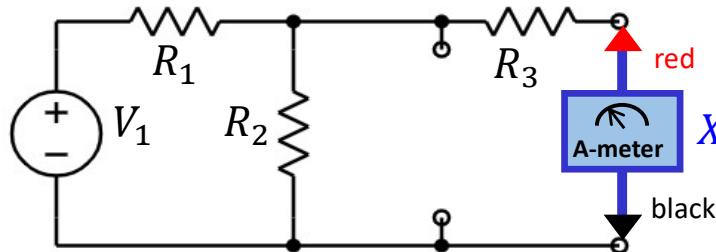
- (a) Find the node voltage v_x .
- (b) Find the node voltage v_y .



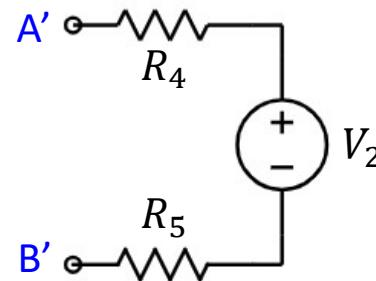
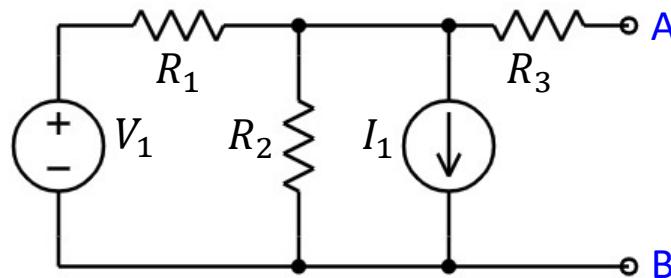
R1:	2Ω
R2:	1Ω
R3:	2Ω
R4:	2Ω
V1:	1 V
V2:	2 V
k:	3 V/V

Consider the experiments shown below. For the circuit on the left, the ammeter measurement is X . For the one on the right, it is Y . The ammeters are ideal. You are not given the values of the independent sources (but note their directions).

R_1 :	2Ω
R_2 :	2Ω
R_3 :	1Ω
R_4 :	2Ω
R_5 :	8Ω
V_1 :	$2 V$
X :	$1 A$
Y :	$1.5 A$



- a. For the new circuit below on the left, what is the Norton resistance R_N between A and B ?
- b. If you connect the circuit below on the right to the one on the left (A' connected to A and B' to B), what is the power P received by resistor R_4 ?



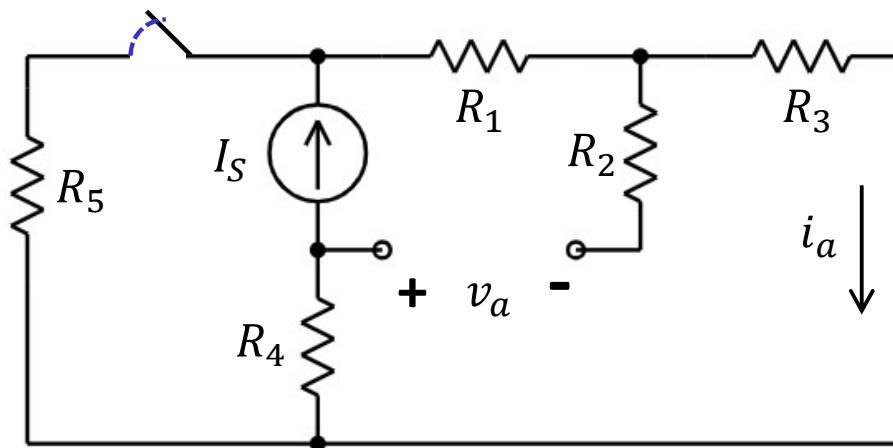
Q1

For the first two sub-questions, the switch is open.

- What is the voltage v_a ?
- What is the power P_1 supplied by the resistor R_1 ?

For the next two sub-questions, the switch is closed.

- What is the current i_a ?
- What is the power P_2 received by the current source?

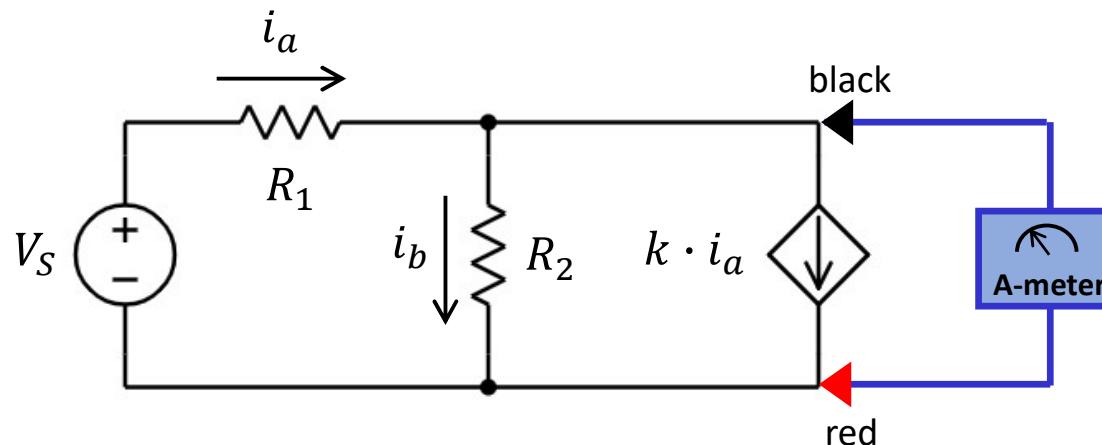


R1:	1 Ω
R2:	1 Ω
R3:	5 Ω
R4:	0 Ω
R5:	3 Ω
Is:	3 A

Q2

In the problem below, the ammeter is ideal.

- What is the current i_b ?
- What is the reading X of the ammeter?
- We make two changes to the circuit: (1) we replace the ideal ammeter with an ideal voltmeter (without changing the positions the red and black terminals) and (2) we change the value of V_S such that i_a is now 1 A. In this new circuit, what is the reading Y of the newly-placed voltmeter?



$R_1:$	2Ω
$R_2:$	1Ω
$k:$	3
$V_s:$	2 V