2.12

- 8mA – 4mA = 0

- 12mA = 0

= 12mA

8mA - -2mA = 0

- + 6mA = 0

= 6mA

2.17

1. 4mA - 2 - = 0

2 = 4mA -

2. - 2mA – 4mA = 0

- 6mA = 0

= 6mA

3. 4mA -2(6mA) - = 0

4mA – 12mA - = 0

- 8mA - = 0

= 8mA

2.27

8V - 12V + 20V + 14V + 4V - 12V - 16V + = 0

46V – 40V + = 0

6V + = 0

= - 6V

14 + 4 – 8 + = 0

18 – 8 + = 0

10 + = 0

= - 10

-12 + 20 – - = 0

-12 + 20 –(-10) - = 0

-12 + 20 + 10 - = 0

-12 + 30 - = 0

18 - = 0

= - 18

**=** 18 + 8

= 26

= 12 – 4 – 14 - 20

= 8 – 34

= - 26

= 16 + 12 – 4

= 28 – 4

= 24

= - 20 + 12 -8

= 12 - 28

= - 16

= 8 – 12

= -4

= 6 + 16 +12 – 4

= 34 – 4

= 30

= - 4 – 14

= - 18

= -20 + 12

= - 8

= - 6 + 8 -12

= 8 -18

= - 10

2.31

KVL

12V + - 4 + = 0

12V - 3 + = 0

= 3 – 12V

KVL across closed loop

12V + - 4 + 2I + 2(3 – 12V) = 0

12V - 3+ 2I + 6– 24V = 0

3 + 2I – 12V = 0

3(4I) + 2I – 12V = 0

12I + 2I -12V = 0

14I – 12V = 0

14I = 12V

I = V

IF = 3V

THEN 2 = 2)

I = 4(V) =

2 = 2)

= 6

= 6

=

=

=

2.46

KVL Left Loop

-20V + 10I + = 0

-20V + 10I = 0

20V = 10I

I = 2A

KVL outer loop

-20V + 10I +20I + = 0

-20V + 10(2A) +20(2A) + = 0

-20V + 60V + = 0

= - 40A

2.49

=

=

4m -2m – I = 0

2m – I = 0

I = 2mA

=I

=(2m)(

=

=1.176V

= (4m)(1.176)

= 4.7mW

=(-2m)(1.176)

= -2.35mW

2.54

=

=

= (k)

KCL

3mA - 2Va - (Va)/(-20/39)kohms

3mA -2Va - Va39/20b(mA) = 0

3mA = 2Va + Va(39/20)

Va(2000m +1.95m) = 3m

Va(2001.95) = 3m

 Va = 3m/2001.95m = .0014985V = 1.4mV

P = Va(I)

P = Va(2Va)

P = 2Va^2

P= 2\*0.0014985^2

P= 2\* 0.0000022455

P = .000004491W

2.62

Resistors in series on the far right side and far left side

R = 6 +6 = 12

R = 6 +6 = 12

Resistor on the right side 12 ohms is in parallel with resistor on the bottom 6 ohms

= = = 4 ohms

Resistor at the bottom right 14 ohms is now in parallel with the 4 ohm resistor and they are both now parallel with the 9 ohm resistor in the middle

= 18 ohms

= = = 6 ohms

Now the resistor at the top of the circuit 6 ohms is in series with another 6 ohm resistor and becomes 12 ohms now we have three 12 ohm resistors in parallel. So

= = = 4 ohms

2.92

= = 2A

KVL

-12 + 4 - = 0

-8 - = 0

= -8V

At node 1

= = = -4A

+ - = 0

-(-4) + -2 = 0

= -2A