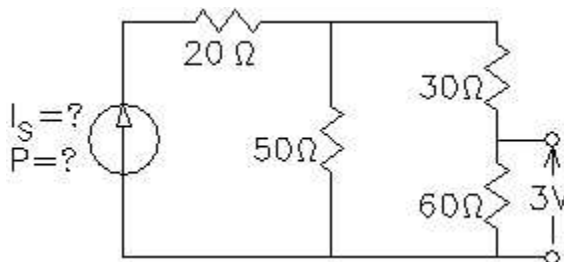# EE1050/60   Exam 1   given: Fall 00   (The space between problems has been removed.)
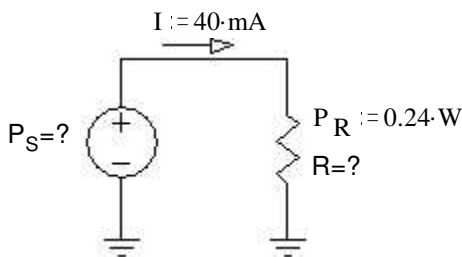
1. (16 pts) Refer to the figure.
   a)   What is the value of the current source?
   b)   How much power does it contribute to the circuit?

$I_s = ?$
$P = ?$

$20\ \Omega$
50Ω
30Ω
60Ω $3V$

2. (7 pts) Refer to the figure.
   a)   What is the value of the resistor?
   b)   How much power does the voltage
        source contribute to the circuit?

$P_s = ?$

$I := 40 \cdot mA$

$P_R := 0.24 \cdot W$
$R = ?$

3. a) (11 pts) Find and draw the Thévenin equivalent of the circuit
   shown. The load resistor is R_L.

   b) (7 pts) Find and draw the Norton
   equivalent of the same circuit.

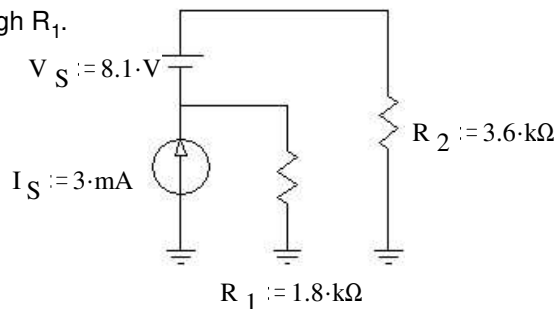   c) (3 pts) Find the load voltage using your
   Thévenin equivalent circuit.

$R_2 := 1.8 \cdot k\Omega$
$R_1 := 2.4 \cdot k\Omega$
$R_L := 910 \cdot \Omega$
$I_S := 4 \cdot mA$
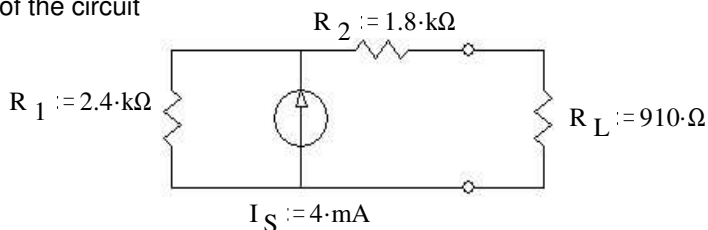
4. a) (15 pts) Use the method of superposition to find the current trough R_1.
   Be sure to clearly show and **circle** your intermediate results.

$V_S := 8.1 \cdot V$
$I_S := 3 \cdot mA$
$R_2 := 3.6 \cdot k\Omega$
$R_1 := 1.8 \cdot k\Omega$

   b) (3 pts) What is the direction of this current? Circle one:

        UP   DOWN

5. (14 pts) Nodal analysis.
   a) Select a ground (reference) node and label it on the schematic.

   b) Label other nodes as necessary to perform nodal analysis.

   c) How many simultaneous equations will you need
   to perform this analysis?

   d) Write all the necessary equations in terms of the
   resistors, the sources, and the unknown nodes.
   Just write and circle the equations, do not try to
   simplify or solve them.

V_S R_1 R_2 I_S
R_3 R_4
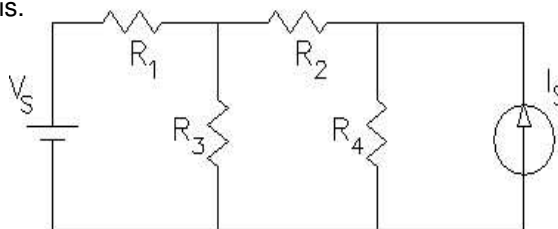
EE1050/60   Exam 1   Fall 00   p1

6. (20 pts) For the waveform shown, find:
   a) peak-to-peak voltage or current, V_{pp}
   b) amplitude, A
   c) period, T
   d) frequency f in cycles/sec or Hz
   e) frequency ω in radians/sec
   f) the phase angle in degrees
   g) a complete expression for v(t), include numbers and units
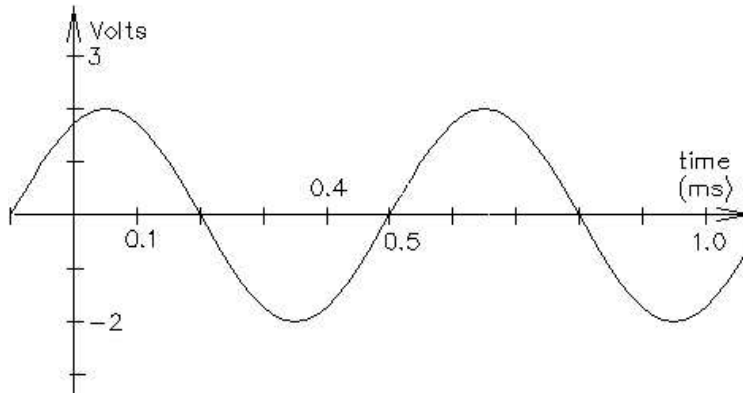
7. (4 pts) The question below is similar to what you might see on the FE exam. They expect you to answer this in less than 2 minutes.

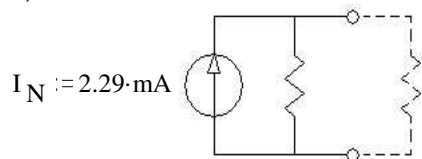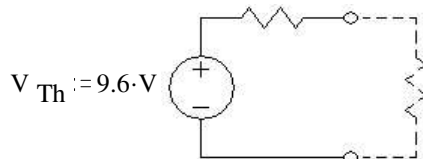6. What is the voltage across the 10 Ω resistor in the circuit shown?
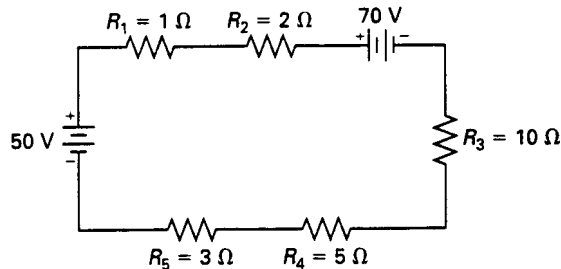
(A) 9.5 V
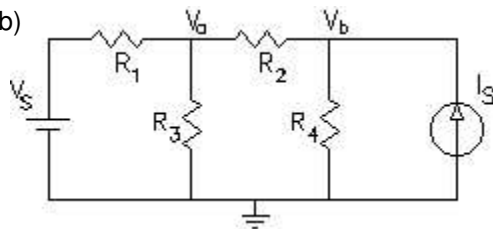(B) 24 V
(C) 33 V
(D) 57 V

circle one

Answers

1.a) 140mA   b) 1.022W   2.a) 150Ω b) 0.24W

3.a) $R_{Th} := 4.2 \cdot k\Omega$ b) $R_N := 4.2 \cdot k\Omega$ c) 1.71V

$V_{Th} := 9.6 \cdot V$ $I_N := 2.29 \cdot mA$

4.a) -1.5mA + 2mA = 0.5mA   b) DOWN

5.a) & b)   c) 2   d) $\dfrac{V_s - V_a}{R_1} = \dfrac{V_a - V_b}{R_2} + \dfrac{V_a}{R_3}$

                                                   & $\dfrac{V_a - V_b}{R_2} + I_S = \dfrac{V_b}{R_4}$

6.a) $V_{pp} = 4 \cdot V$ b) $A = 2 \cdot V$ c) $T = 0.6 \cdot ms$ d) $f = 1667 \cdot Hz$ e) $\omega = 1.047 \cdot 10^4 \cdot \dfrac{rad}{sec}$

f) $\phi = -30 \cdot deg$ g) $v(t) := 2 \cdot V \cdot \cos\left(10470 \cdot \dfrac{rad}{sec} \cdot t - 30 \cdot deg\right)$

7. A