



UNIVERSIDAD DE EL SALVADOR
FACULTAD MULTIDISCIPLINARIA ORIENTAL
DEPARTAMENTO DE INGENIERÍA Y ARQUITECTURA

ASIGNATURA:

SISTEMAS DIGITALES

ACTIVIDAD:

TAREA #1

DOCENTE:

.ING.DAVID ALONSO MENDOZA ARTIGA

ESTUDIANTE:

VELÁSQUEZ VICTORIA GABRIELA VV19020

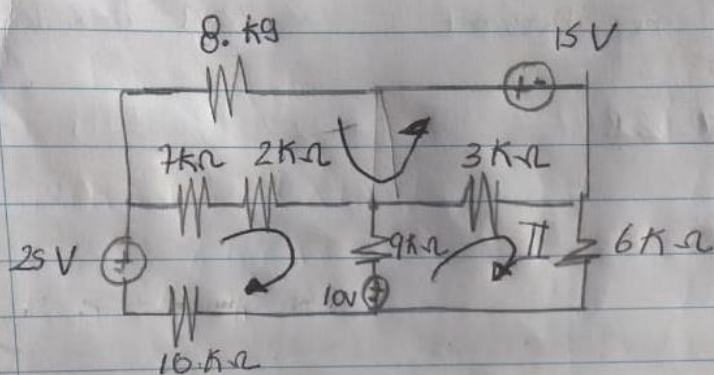
Lunes 17 DE MARZO 2021

San Miguel , El salvador

Ejercicio #1

Calcular I_1 , I_2 , I_3 y la potencia en la resistencia $3k\Omega$

" Por metodo de mallas



fuentes de voltaje y 4 Resistencias

Por ley de Kirchhoff; $\sum V = 0$

$$\sum V = \sum IR$$

Malla I: $25 - 10 = (7 + 2 + 9 + 10)I_1 + (7 + 2)I_3 - 9I_2$
 $15 = 28I_1 - 9I_2 + 9I_3$ Ecuacion 1

Malla II $10 = (9 + 3 + 6)I_2 - 9I_1 + 3I_3$
 $10 = -9I_1 + 18I_2 + 3I_3$ Ecuacion 2

Malla III $15 = (8 + 7 + 2 + 3)I_3 + (7 + 2)I_1 + 3I_2$
 $15 = 9I_1 + 3I_2 + 20I_3$ Ecuacion 3

$$I_1 = \frac{4500}{6264}$$

$$I_2 = \frac{5420}{6264}$$

$$I_3 = \frac{1860}{6264}$$

$$I_1 = 0,720 \text{ mA}$$

$$I_2 = 0,865 \text{ mA}$$

$$I_3 = 0,296 \text{ mA}$$

$$P_{3k} = I^2 R$$

$$P_{3k} = (1,161 \times 10^{-3})^2 (3000)$$

$$I_4 = I_2 + I_3$$

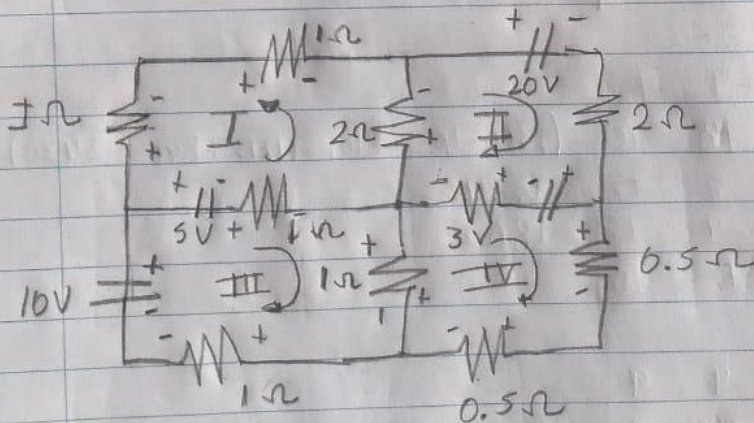
$$P_{3k} = 4,04 \times 10^{-3} \text{ W}$$

$$I = 0,865 \text{ mA} + 0,296 \text{ mA}$$

$$P_{3k} = 4,04 \text{ mW}$$

$$I = 1,161 \text{ mA}$$

Ejercicio #2



"Solution"

$$\sum V = 0 \rightarrow \sum IR = 0$$

malla I: $6I_1 - 5 - 3I_2 - 1I_3 = 0$
 $6I_1 - 3I_2 - I_3 = 5$ ec: 1

malla II: $7I_2 + 20 + 3 - 2I_4 - 3I_1 = 0$
 $-3I_1 + 7I_2 - 2I_4 = -23$ ecuacion 2

malla III: $3I_3 + 5 + 10 - I_1 - I_4 = 0$
 $-I_1 + 3I_3 - I_4 = -5$ ecuacion 3

malla IV: $4I_4 - 3 - 2I_2 - I_3 = 0$
 $-2I_2 - I_3 + 4I_4 = 3$ ecuacion 4

$$\begin{cases} 6I_1 - 3I_2 - I_3 = 5 \\ -3I_1 + 7I_2 - 2I_4 = -23 \\ -I_1 + 3I_3 - I_4 = -5 \\ -2I_2 - I_3 + 4I_4 = 3 \end{cases}$$

$$\left(\begin{array}{ccccc|ccccc} 6 & -3 & -1 & 0 & 5 & \rightarrow f_1 & \rightarrow f \\ -3 & 7 & 0 & -2 & -23 & & \\ -1 & 0 & 3 & -1 & 5 & \frac{6}{6} & -\frac{3}{6} & -\frac{1}{6} & \frac{0}{6} & \frac{5}{6} \\ 0 & -2 & -1 & 4 & 3 & 1 & -\frac{1}{2} & -\frac{1}{6} & 0 & \frac{3}{4} \end{array} \right)$$

$$\left(\begin{array}{ccccc|ccccc} 1 & -\frac{1}{2} & -\frac{1}{6} & 0 & \frac{5}{6} & f_1 + 3f_1 \rightarrow f_2 & \\ 0 & \frac{1}{2} & -\frac{1}{2} & -2 & -\frac{41}{6} & -3 & 7 & 0 & -2 & -23 \\ 0 & -\frac{1}{2} & \frac{17}{6} & -1 & \frac{35}{6} & 3 & 1 & -\frac{1}{2} & -\frac{1}{6} & 0 & \frac{5}{6} \\ 0 & -2 & -1 & 4 & 3 & 0 & \frac{1}{2} & -\frac{1}{2} & -2 & -\frac{41}{2} \end{array} \right)$$

$$\begin{array}{ccccc|ccccc} f_3 + 1f_1 \rightarrow f_3 & & & & & & & & & & \\ -1 & 0 & 2 & -1 & 5 & & & & & & \\ 1 & -\frac{1}{2} & -\frac{1}{6} & 0 & \frac{5}{6} & & & & & & \\ \hline 0 & -\frac{1}{2} & \frac{17}{6} & -1 & \frac{35}{6} & & & & & & \end{array}$$

$$\left(\begin{array}{cccc|c} 1 & -1/2 & -1/6 & 0 & 15/6 \\ 0 & 1 & -1/11 & -4/11 & -41/11 \\ 0 & -1/2 & 17/6 & -1 & 35/6 \\ 0 & -2 & -1 & 4 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right) \quad f_2 \times 2/11$$

$$\begin{array}{c} 2/11 \left(\begin{array}{cccc} 1 & -1/2 & -1/2 & -2 & -41/11 \end{array} \right) \\ 1 & -1/11 & -4/11 & -11/11 \end{array}$$

$$f_1 + 1/2 f_2 \rightarrow f_1$$

$$\begin{array}{c} -1/2 \quad -1/6 \quad 0 \quad 5/6 \\ 1/2 \left(\begin{array}{cccc} 1 & -1/11 & -11/11 & -41/11 \end{array} \right) \\ 0 \quad -7/33 \quad -2/11 \quad 54/33 \end{array}$$

$$\left(\begin{array}{cccc|c} 1 & 0 & -7/33 & -2/11 & -34/33 \\ 0 & 1 & -1/11 & -4/11 & -41/11 \\ 0 & 0 & 92/33 & -13/11 & 131/33 \\ 0 & 0 & -13/11 & 36/11 & -49/11 \end{array} \right) \quad -f_3 + 1/2 f_2 \rightarrow -f_3$$

$$\begin{array}{c} -1/2 \quad 17/6 \quad -1 \quad 35/6 \\ 1/2 \left(\begin{array}{cccc} 1 & -1/11 & -4/11 & -41/11 \end{array} \right) \\ 0 \quad 92/33 \quad -13/11 \quad 131/33 \end{array}$$

$$f_4 + 2f_2 \rightarrow f_4$$

$$\begin{array}{c} -2 \quad +1 \quad 4 \quad 3 \\ 2/11 \left(\begin{array}{cccc} 1 & -1/11 & -4/11 & -41/11 \end{array} \right) \\ 0 \quad 13/11 \quad 36/11 & -49/11 \end{array}$$

$$\left(\begin{array}{cccc|c} 1 & 0 & -7/33 & -2/11 & -34/33 \\ 0 & 1 & -1/11 & -4/11 & -41/11 \\ 0 & 0 & 1 & 31/92 & 131/92 \\ 0 & 0 & -13/11 & 36/11 & -49/11 \end{array} \right) \quad f_3 \times 33/92$$

$$\begin{array}{c} 33/92 \left(\begin{array}{ccc} 1 & 14/33 & -13/11 \end{array} \right) \\ 1 & -39/92 & 131/92 \end{array}$$

$$f_2 + 1/2 I_3 \rightarrow f_2$$

$$\begin{array}{c} -1/11 \quad -4/11 \quad -41/11 \\ 1/11 \left(\begin{array}{ccc} 1 & -39/92 & 131/92 \end{array} \right) \\ 0 \quad -37/48 \quad -331/92 \end{array}$$

$$f_1 + 7/33 f_3 \rightarrow f_1$$

$$\begin{array}{c} -7/33 \quad -2/11 \quad -34/33 \\ 7/3 \left(\begin{array}{ccc} 1 & -39/92 & 131/92 \end{array} \right) \\ 0 \quad -25/92 \quad -67/92 \end{array}$$

$$\begin{pmatrix} 1 & 0 & 0 & -25/92 & -67/92 \\ 0 & 1 & 0 & -37/92 & -33/92 \\ 0 & 0 & 1 & -39/92 & 131/92 \\ 0 & 0 & -13/11 & 36/11 & -49/11 \end{pmatrix} \begin{array}{l} f_4 + 13/11 f_3 \rightarrow f_4 \\ -13/11 \quad 36/11 \quad 49/11 \\ 13/11 \mid 1 \quad -39/92 \quad 131/92 \\ 0 \quad 255/92 \quad -255/92 \end{array}$$

$$f_4 \times 92/255 \rightarrow f_4$$

$$92/255 \mid 255/92 \quad -255/92$$

$$1 \quad -1$$

$$f_1 + 25/92 f_4 \rightarrow f_1$$

$$\begin{array}{cc} -25/92 & -67/92 \\ 25/92 \mid 1 & -1 \\ 0 & -1 \end{array}$$

$$f_2 + 37/92 f_4 \rightarrow f_2$$

$$\begin{array}{cc} -37/92 & -33/92 \\ 37/92 \mid 1 & -1 \\ 0 & -4 \end{array}$$

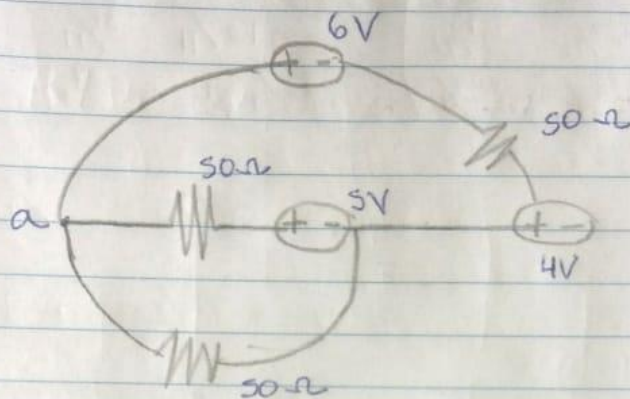
$$f_3 + 39/92 f_4 \rightarrow f_3$$

$$\begin{array}{cc} -39/92 & 121/92 \\ 39/92 \mid 1 & -1 \\ 0 & 1 \end{array}$$

$$\left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & -4 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 3 \end{array} \right)$$

$$\begin{array}{l} I_1 = -1 \text{ A} \\ I_2 = -4 \text{ A} \\ I_3 = 1 \text{ A} \\ I_4 = -1 \text{ A} \end{array}$$

encontrar la corriente en cada resistencia.



b) $V_{ab} = ?$

$R/I_1 = 6.67 \text{ mA}$

$I_2 = 46.7 \text{ mA}$

$I_3 = 33.3 \text{ mA}$

en malla 1: $4 + 5 - 50I_1 - 50I_1 - 6 - 50I_1 = 0$

en malla 2: $-50I_2 + 5 - 50I_2 - 50I_1 = 0$

$M_1 = 3 - 100I_1 - 50I_2 = 0 \rightarrow 100I_1 + 50I_2 = 3$

$M_2 = 5 - 50I_1 - 100I_2 = 0 \rightarrow 50I_1 + 100I_2 = 5$

100	50	L_1	=	3
50	100	L_2	=	5

$\begin{vmatrix} 100 & 50 \\ 50 & 100 \end{vmatrix} = (100)(100) - (50)(50) = 7,500$

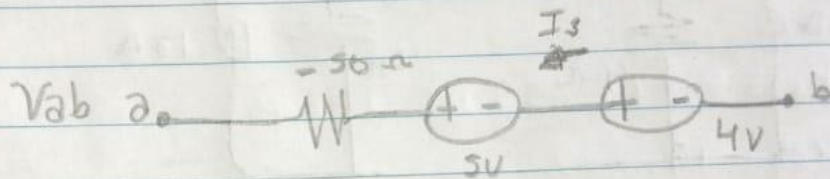
$\begin{vmatrix} 3 & 50 \\ 5 & 100 \end{vmatrix} = (3)(100) - (5)(50) = 50 \quad I_1$

$\begin{vmatrix} 100 & 2 \\ 50 & 5 \end{vmatrix} = (100)(5) - (3)(50) = 350 \pm 2$
 $V_{ab} = ? \quad V_a - V_b$

$$I_1 = \frac{50}{7,500} = 6.67 \text{ mA}$$

$$I_2 = \frac{350}{7,500} = 46.7 \text{ mA}$$

$$I_3 = I_1 + I_2 \rightarrow I_3 = 58.3 \text{ mA}$$



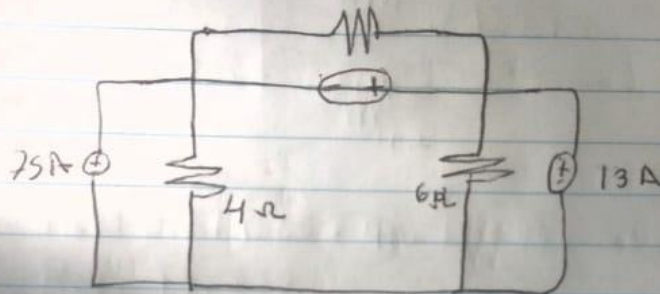
$$V_a + 50(58.3 \times 10^{-3}) - 5 - 5 = V_b$$

$$V_a - V_b = 5 + 4 - 2.67$$

$$V_a - V_b = 6.33 \text{ V}$$

4- Calcular el voltaje en cada nodo
CKJ. $V_{ab} = 6.33V$

$R/V_1 = 5V \quad V_2 = 7V$



LoK

$$75A = i_1 + i_2$$

$$75A = \frac{V_1}{4} + \frac{V_1 - V_2}{5}$$

$$75A = \frac{1}{4}V_1 + \frac{1}{5}V_1 - \frac{1}{5}V_2$$

$$75A = 4V_1 + 5V_1 - 5V_2$$

$$75A = 9V_1 - 5V_2 \rightarrow \text{Equation 1}$$

Resolvemos

$$V_1 = \frac{5 \times 10}{9} = 5V$$

$$i_2 = i_3 + 13$$

$$\frac{V_1}{5} - \frac{V_2}{5} = V_2 + 13A$$

$$\cancel{5} V_1 - 5V_2 - V_2 = 13A$$

$$6V_2 = 13 \rightarrow \text{eq. 2}$$

Resolvemos equation

$$V_2 = 13 - 6 = 7V$$

$$i_1 = \frac{V_1 - 0}{4\Omega} = \frac{V_1}{4}$$

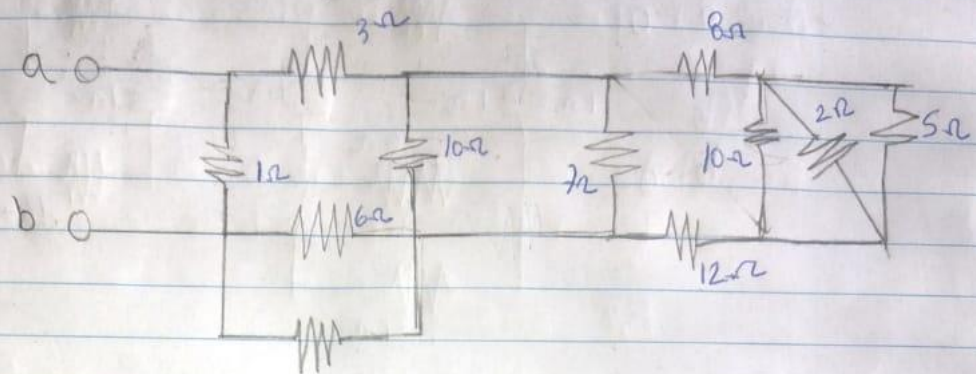
$$i_2 = \frac{V_1 - V_2}{5\Omega}$$

$$i_3 = \frac{V_2}{1}$$

Restamos

$$75A - 65A = 10A$$

5- encontrar Req



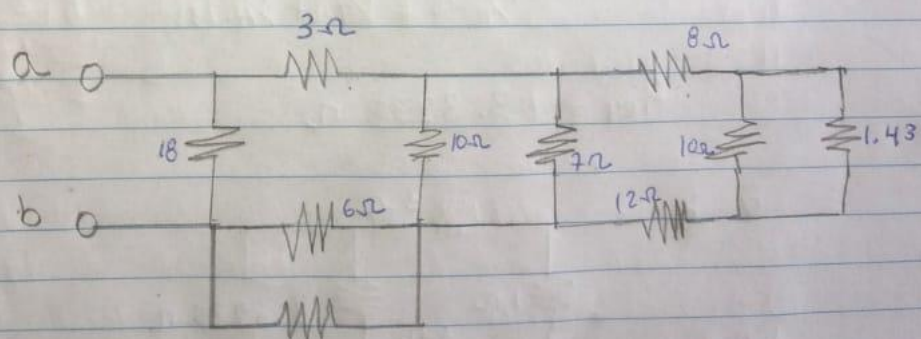
$$R_{eq} = \frac{1}{\frac{1}{2\Omega} + \frac{1}{2\Omega}}$$

$$R_{eq} = \frac{5}{10} + \frac{2}{10}$$

$$R_{eq} = \frac{7}{10}$$

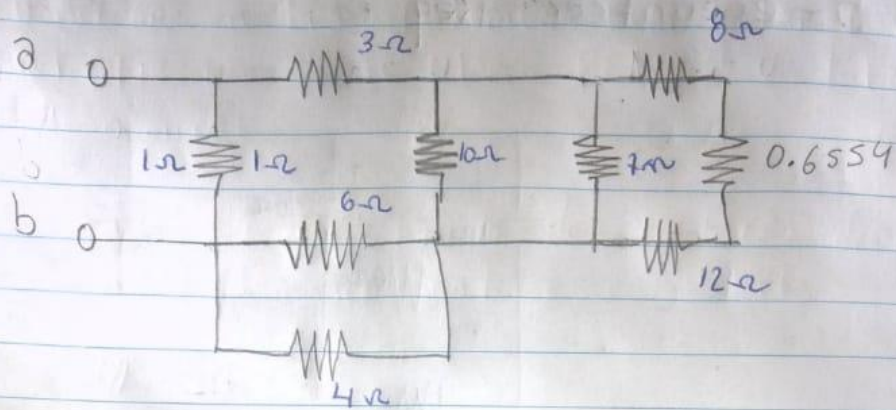
$$R_{eq} = 10/7$$

$$R_{eq} = 1.43\Omega$$



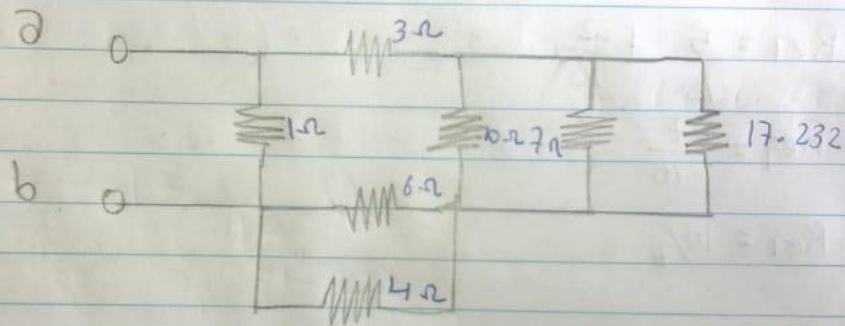
$$\frac{1}{R_{eq}} = \frac{1}{\frac{1}{10\Omega} + \frac{1}{1.43\Omega}}$$

$$R_{eq} = 0.64$$



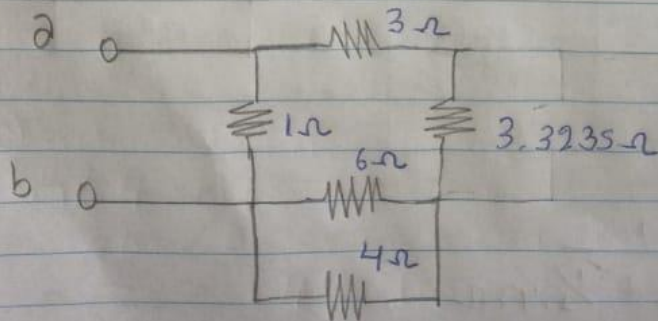
$$R_{eq} = 8\Omega + 0.65 + 4\Omega + 12\Omega$$

$$R_{eq} = 17.232$$

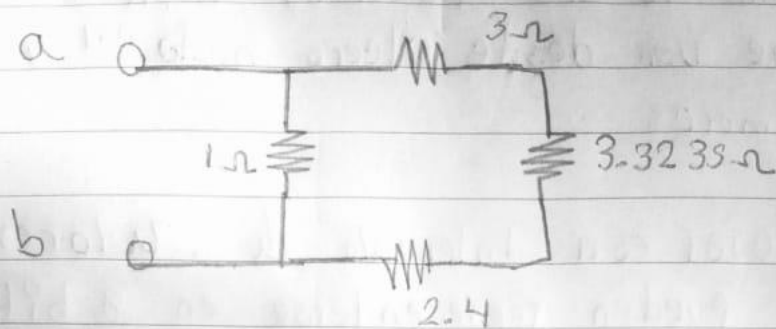


$$\frac{1}{R_{eq}} = \frac{1}{\frac{1}{10\Omega} + \frac{1}{9\Omega} + \frac{1}{17.232}}$$

$$R_{eq} = 3.3235\Omega$$

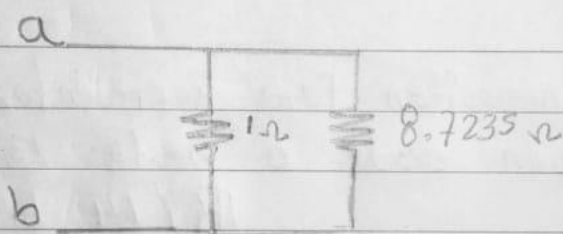


$$R_{eq} = \frac{1}{\frac{1}{6\Omega} + \frac{1}{4\Omega}} = R_{eq} = 2.4\Omega$$



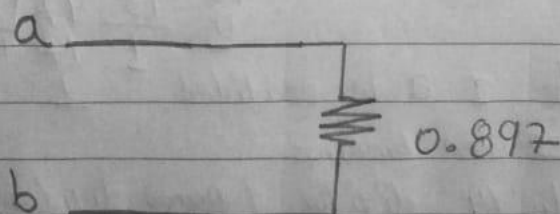
$$R_{eq} = 3\Omega + 3.3235\Omega + 2.4\Omega$$

$$R_{eq} = 8.7235\Omega$$



$$\frac{1}{R_{eq}} = \frac{1}{\frac{1}{1\Omega} + \frac{1}{8.7238}}$$

$$R_{eq} = 0.897$$



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1- convierta de decimal a Binario $(0.65625)_{10} =$

$$0.65625_{10} = (1\ 0101)_{12}$$

$$0.65625 \times 2 = 1.3125$$

$$0.3125 \times 2 = 0.625$$

$$0.625 \times 2 = 1.25$$

$$0.25 \times 2 = 0.50$$

$$0.50 \times 2 = 1$$

Comprobación

$$\begin{array}{cccccc} 0 & 1 & 0 & 1 & 0 & 1 \\ 2^{-1} & 2^{-2} & 2^{-3} & 2^{-4} & 2^{-5} & \end{array}$$

$$0.5 + 0 + 0.125 + 0 + 0.03125$$

$$= 0.65625$$

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2- convierte Decimal a Binario (313)₁₀

$$313 = 100111001_{(2)}$$

313	156	78	39	19	9	4	2
2	2	2	2	2	2	2	2
153	14	78	39	19	9	4	2
10	16	6	39	19	9	4	2
13	0	18	2	19	9	4	2
1		0	19	18	9	4	2
			1	1	1	4	2
						0	2
						0	1

100111001

3- convierte (0.101101)₂ a Decimal

$$0.101101 = 0.703125$$

$$2^{-1} 2^{-2} 2^{-3} 2^{-4} 2^{-5} 2^{-6}$$

$$0.5 + 0 + 0.125 + 0.0625 + 0 + 0.015625$$

$$R11 = 0.703125$$

"Comprobación"

$$0.703125 \times 2 = 1.40625$$

$$0.40625 \times 2 = 0.8125$$

$$0.8125 \times 2 = 1.625$$

$$0.625 \times 2 = 1.25$$

$$0.25 \times 2 = 0.5$$

$$0.5 \times 2 = 1$$

0101101

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4- convertir $(274.1875)_{10}$ a Binario = R/(100010010.001)

$$\begin{array}{r} 274 \div 2 \\ \hline 07 \quad 137 \div 2 \\ \hline 14 \quad 17 \quad 68 \div 2 \\ \hline 0 \quad 1 \quad 08 \quad 34 \div 2 \\ \hline \quad \quad 14 \quad 17 \div 2 \\ \hline \quad \quad 0 \quad 1 \quad 8 \div 2 \\ \hline \quad \quad \quad 0 \quad 4 \div 2 \\ \hline \quad \quad \quad 0 \quad 2 \div 2 \\ \hline \quad \quad \quad \quad 0 \quad 1 \end{array}$$

100010010

$$0.1875 \times 2 = 0.375$$

$$0.375 \times 2 = 0.75$$

$$0.75 \times 2 = 1.5$$

$$0.5 \times 2 = 1 \quad \swarrow \quad 0011$$

$$R/ 274.1875_{(10)} = 100010010.0011_{(2)}$$

"Comprobación"

$$100010010.0011$$

$$0 \times 2^0 + 1 \times 2^1 + 0 \times 2^2 + 0 \times 2^3 + 1 \times 2^4 + 0 \times 2^5 + 0 \times 2^6 + 0 \times 2^7 + 1 \times 2^8$$

$$0 + 2 + 0 + 0 + 16 + 0 + 0 + 0 + 256$$

$$= 274 \Rightarrow \text{lado Positivo.}$$

$$0 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3} + 1 \times 2^{-4}$$

$$0 + 0 + 0.125 + 0.0625 = 0.1875$$

lado negativo

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5- $(1f)_{16}$ a Decimal = $1f_{(16)} = 31_{(10)}$

Decimal	hexadecimal
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	f

1 f

↓ ↓

1 0

$$16^0 = 1$$

$$16^1 = 16$$

$$1 \times 16^1 = 16$$

$$15 \times 16^0 = 15$$

$$16 + 15 = 31_{(10)}$$

6- $(1ff)_{16}$ a Decimal = $511_{(10)}$

1 f f

↓ ↓ ↓

2 1 0

f

f

$$1 \times 16^2$$

$$15 \times 16^1$$

$$15 \times 16^0$$

$$256 + 250 + 15 = 511$$

$$R/ 1ff_{(16)} = 511_{(10)}$$

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1* si sabemos que

tabla de sumar

Sumando			
+	0	1	
0	0	1	
Incremento			
1	1	0	* suma

$0+0=0$
$0+1=1$
$1+0=1$
$1+1=10$

nota *0 significa acarreo.

* Pregunta

→ 001101

$$\begin{array}{r} + 100101 \\ 001101 \\ \hline 110010 \end{array}$$

$$\begin{array}{r} 13 \\ + 19 \\ \hline 56 \end{array}$$

$$\begin{array}{r} 1011011 \\ 1011010 \\ \hline R1 10110101 \end{array} \quad \begin{array}{r} 110111011 \\ 001111011 \\ \hline 1011110110 \end{array}$$

* 1011011

6 5 4 3 2 1 0

$$1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$64 + 0 + 16 + 8 + 0 + 2 + 1$$

91

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$$* \begin{array}{ccccccc} 1 & 0 & 1 & 1 & 0 & 1 & 0 \\ 6 & 5 & 4 & 3 & 2 & 1 & 0 \end{array}$$

$$1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$$

$$64 + 0 + 16 + 8 + 0 + 2 + 0$$

$$= 90$$

$$\begin{array}{ccccccc} & 64 & 32 & 16 & 8 & 4 & 2 \\ 1 & 0 & 1 & 1 & 0 & 1 & 0 \\ + & 1 & 0 & 1 & 1 & 0 & 1 & 0 \\ \hline 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 \end{array}$$

$$\left(\begin{array}{r} 91 \\ + 90 \\ \hline 181 \end{array} \right)$$

$$\begin{array}{r} 181 \overline{) 2} \\ 01 \quad 90 \overline{) 2} \\ 1 \quad 10 \quad 45 \overline{) 2} \\ \quad 0 \quad 05 \quad 22 \overline{) 2} \\ \qquad 1 \quad 0 \quad 11 \overline{) 2} \\ \qquad \quad 10 \quad 5 \overline{) 2} \\ \qquad \qquad 1 \quad 4 \quad 2 \overline{) 2} \\ \qquad \qquad \qquad 1 \quad 0 \quad 1 \end{array}$$

$$10110101$$

$$* \begin{array}{ccccccc} 1 & 1 & 0 & 1 & 1 & 1 & 0 & 1 & 1 \\ 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1 & 0 \end{array}$$

$$1 \times 2^8 + 1 \times 2^7 + 0 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$256 + 128 + 0 + 32 + 16 + 8 + 0 + 2 + 1$$

$$= 443$$

sigue →

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$$\begin{array}{r} * \quad 100111011 \\ \quad 876543210 \end{array}$$

$$1 \times 2^8 + 0 \times 2^7 + 0 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$256 + 0 + 0 + 32 + 32 + 16 + 8 + 0 + 2 + 1$$

$$= 315$$

$$\begin{array}{r} 110111011 \\ 100111011 \\ \hline 1011110110 \end{array}$$

$$\begin{array}{r} 443 \\ + 315 \\ \hline 758 \end{array}$$

$$758 \mid 2$$

$$15$$

$$379 \mid 2$$

$$18$$

$$17$$

$$189 \mid 2$$

$$0$$

$$19$$

$$0994 \mid 2$$

$$1$$

$$1$$

$$14$$

$$17 \mid 2$$

$$0$$

$$07$$

$$23 \mid 2$$

$$1$$

$$03$$

$$11 \mid 2$$

$$1$$

$$1$$

$$5 \mid 2$$

$$1$$

$$2 \mid 2$$

$$0$$

$$1$$

1011110110

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Conversiones

Binario	hexadecimal	Decimal	BCD
1001 1010 +	9A +	154 +	0001 0101 0100 +
01011101010010 +	2F52 X	12,114 X	0001 0010 0001 0001 0100 +
1100111001.11 +	339C X	825.75 X	0001 0010 0101 0111 0101 +
10110 X	16 X	22 X	0010 0001 0111 0011 X
100010000011	883	2,179	0100 0001 0010 1010
1111 1111 1111 +	FFFF +	4095 +	0100 0001 1001 0111
0100.000100010000	4.199374BC6A16 FDB2 DO X	4.096	0100.0000 1001 0110
1111 00111 X	1571 X	487 X	0100 1000 0111 X
00000010111010	017A X	378 X	0011 0111 0001 X

"Solución"

Convertir $(9A)_{16}$ a Decimal

$$\begin{array}{r}
 9A \\
 10
 \end{array}
 \quad
 \begin{array}{r}
 9 \times 16 + 10 \times 6 \\
 144 + 10 = 154
 \end{array}$$

Convertir $(9A)_{16}$ a Binario.

$$\begin{array}{l}
 9 = 1001 \rightarrow 1001 \ 1010 \\
 A = 1010
 \end{array}$$

Convertir $(9A)_{16}$ a BCD

$$\begin{array}{ccc}
 1 & 5 & 4 \\
 0001 & 0101 & 0100
 \end{array}$$

2.ºa

Convertir 010111101010010 a Decimal

14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

$$0 \times 2^{14} + 1 \times 2^{13} + 0 \times 2^{12} + 1 \times 2^{11} + 1 \times 2^{10} + 1 \times 2^9 + 1 \times 2^8 + 0 \times 2^7 + 1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 =$$

$$0 + 8192 + 0 + 2048 + 1024 + 512 + 256 + 0 + 64 + 0 + 16 + 0 + 2 + 0$$

$$= 12,114$$

* Convertir 010111101010010 a Hexadecimal

0101111 01010010
2 F 5 2

R/ 2f52

* Convertir 12,14 a BCD

1 2 1 1 4

0001 0010 0001 0001 0100

Convertir 825.75 a Binario =

$$\begin{array}{r} 825 \div 2 \\ \hline 02 \quad 412 \div 2 \\ \hline 05 \quad 01 \quad 206 \div 2 \\ \hline 1 \quad 12 \quad 00 \quad 103 \div 2 \\ \hline 06 \quad 03 \quad 51 \div 2 \\ \hline 1 \quad 11 \quad 25 \div 2 \\ \hline 05 \quad 12 \div 2 \\ \hline 0 \quad 6 \div 2 \\ \hline 0 \quad 3 \div 2 \\ \hline 1 \end{array}$$

R/ 1100111001

Convertir 825.75 a hexadecimal

parte entera

$$\begin{array}{r}
 825 \div 16 \\
 \hline
 25 \quad 51 \quad 16 \\
 0 \quad 3 \quad 3 \quad 16 \\
 \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\
 9 \quad 3 \quad 4 \quad 0
 \end{array}$$

3390

Parte fraccion

$$0.75 \times 16 = 12.0$$

* (fff) a Decimal

$$\begin{array}{ccc}
 f & f & f \\
 2 & 1 & 0
 \end{array}$$

$$\begin{aligned}
 & 15 \times 16^2 + 15 \times 16^1 + 15 \times 16^0 \\
 & 3,840 + 240 + 15 = 4,095
 \end{aligned}$$

* convertir fff a Binario

$$f = 1111$$

$$f = 1111 \Rightarrow 1111 \quad 1111 \quad 1111$$

$$f = 1111$$

* 4.096 a Binario | 0100.00001100010610011011 |

$$\begin{array}{r}
 4 \overline{) 2} \\
 0 \overline{) 2} \overline{) 1} \overline{) 0} \\
 1 \quad 0
 \end{array}$$

0100

$$\begin{array}{ll}
 0.096 \times 2 = 0.192 & 0.152 \times 2 = 0.304 \\
 0.192 \times 2 = 0.384 & 0.304 \times 2 = 0.608 \\
 0.384 \times 2 = 0.768 & 0.608 \times 2 = 1.216 \\
 0.768 \times 2 = 1.536 & 0.216 \times 2 = 0.432 \\
 0.536 \times 2 = 1.072 & 0.432 \times 2 = 0.864 \\
 0.072 \times 2 = 0.144 & 0.364 \times 2 = 0.728 \\
 0.144 \times 2 = 0.288 & 0.728 \times 2 = 1.456 \\
 0.288 \times 2 = 0.576 & 0.456 \times 2 = 0.912 \\
 0.576 \times 2 = 1.152 & 0.912 \times 2 = 1.824 \\
 & 0.514 \times 2 = 1.028 \\
 & 0.648 \times 2 = 1.296
 \end{array}$$

Decimal 4095 a BCD

4 0 9 5

$$0100 \ 0000 \ 1001 \ 1101 \rightarrow 4,095_{10} = 0100 \ 0000 \ 1001 \ 1101$$

Decimal 487 a BCD

4 8 7

$$0100 \ 1000 \ 0111 \rightarrow 487_{10} = 0100 \ 1000 \ 0111$$

Decimal 378 a BCD

3 7 8

$$0011 \ 0111 \ 1000 = 378 = 0011 \ 0111 \ 1000$$

Convertir 4.096 a hexadecimal / 4.189374 BC6A76F9DB22D0

$$\begin{array}{r} 4 \overline{) 16} \\ \underline{4} \\ 0 \\ \underline{4} \\ 4 \end{array}$$

$$0.096 \times 16 = 1.536 \rightarrow 0.176 \times 16 = 2.816$$

$$0.1536 \times 16 = 2.4576 \rightarrow 0.816 \times 16 = 13.056 \rightarrow 0$$

$$0.576 \times 16 = 9.216 \rightarrow 0.056 \times 16 = 0.896$$

$$0.216 \times 16 = 3.456$$

$$0.456 \times 16 = 7.296$$

$$0.296 \times 16 = 4.736$$

$$0.736 \times 16 = 11.776 \rightarrow B$$

$$0.776 \times 16 = 12.416 \rightarrow C$$

$$0.416 \times 16 = 6.656$$

$$0.656 \times 16 = 10.496 \rightarrow A$$

$$0.496 \times 16 = 7.936$$

$$0.936 \times 16 = 14.976 \rightarrow E$$

$$0.976 \times 16 = 15.616 \rightarrow F$$

$$0.616 \times 16 = 9.856$$

$$0.856 \times 16 = 13.696 \rightarrow D$$

$$0.696 \times 16 = 11.136 \rightarrow B$$

$$0.136 \times 16 = 2.176$$

Convertir 487 a Binario

$$\begin{array}{r}
 487 \div 2 \\
 \hline
 08 \quad 243 \div 2 \\
 \hline
 07 \quad 04 \quad 121 \div 2 \\
 \hline
 1 \quad 03 \quad 01 \quad 60 \div 2 \\
 \hline
 \quad 1 \quad 1 \quad 00 \quad 30 \div 2 \\
 \hline
 \quad \quad 00 \quad 15 \div 2 \\
 \hline
 \quad \quad \quad 1 \quad 7 \div 2 \\
 \hline
 \quad \quad \quad \quad 1 \quad 3 \div 2 \\
 \hline
 \quad \quad \quad \quad \quad 1 \quad 1 \div 2 \\
 \hline
 \quad \quad \quad \quad \quad \quad 0 \quad 1
 \end{array}$$

111100111

Convertir 487 a hexadecimal

$$\begin{array}{r}
 487 \div 16 \\
 \hline
 07 \quad 30 \div 16 \\
 \hline
 7 \quad 14 \quad 1 = 157
 \end{array}$$

↓
G

* 00000010111010 a Decima

$$\begin{aligned}
 & 0 \times 2^{14} + 0 \times 2^{13} + 0 \times 2^{12} + 0 \times 2^{11} + 0 \times 2^{10} + 0 \times 2^9 + 1 \times 2^8 + 0 \times 2^7 + 1 \times 2^6 + \\
 & 1 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0
 \end{aligned}$$

$$\begin{aligned}
 & 0 + 0 + 0 + 0 + 0 + 0 + 256 + 0 + 64 + 32 + 16 + 8 + 0 + 2 \\
 & = 378
 \end{aligned}$$

22 a Binario

$$\begin{array}{r}
 22 \div 2 \\
 \hline
 02 \quad 11 \div 2 \\
 \hline
 \quad 15 \div 2 \\
 \hline
 \quad \quad 1 \quad 2 \div 2 \\
 \hline
 \quad \quad \quad 0 \quad 1
 \end{array}$$

→ 10110

< 000000101111016 2 hexadecimal

000 0001 0111 1010
 0 1 7 A ⇒ 017A

* 0010, 0010 a Decimal * 22 a hexadecimal
 2 2 ⇒ 22

22 | 16
6 1 → 16

Si utilizamos n bits podemos representar 1 número decimal que van desde 0 hasta $2^n - 1$ un total de 2^n números

Pregunta) ¿cual es el intervalo de valores decimales que pueden representarse en 8 bits

R// 255

Como dice que son 8 bits sustituimos en la formula como: $2^8 = 256 - 1 = 255$

b) Cuantos bits se necesitan para representar valores decimal que van desde 0 hasta 12,500

R// 14 bits

Convertir el numero 12,500 a binario

$$\begin{array}{r}
 12,500 \div 2 = 6250 \text{ residuo } 0 \\
 6250 \div 2 = 3125 \text{ residuo } 0 \\
 3125 \div 2 = 1562 \text{ residuo } 1 \\
 1562 \div 2 = 781 \text{ residuo } 0 \\
 781 \div 2 = 390 \text{ residuo } 1 \\
 390 \div 2 = 195 \text{ residuo } 0 \\
 195 \div 2 = 97 \text{ residuo } 1 \\
 97 \div 2 = 48 \text{ residuo } 1 \\
 48 \div 2 = 24 \text{ residuo } 0 \\
 24 \div 2 = 12 \text{ residuo } 0 \\
 12 \div 2 = 6 \text{ residuo } 0 \\
 6 \div 2 = 3 \text{ residuo } 0 \\
 3 \div 2 = 1 \text{ residuo } 1 \\
 1 \div 2 = 0 \text{ residuo } 1
 \end{array}$$

teniendo como resultado

11000011010100

Si se cuenta desde 1 a la cantidad de digitos que tiene 12500 en binarios

nos da un total de 14 digitos y como digito

Representa 1 bit la respuesta es 14 bits

c) ¿cuantos bytes hay en una cadena de 32 bits

R// 4 bits se divide la cantidad de 32 bits

entre 8 por que es el valor de cada byte

$$\frac{32}{8} = 4 \text{ bytes}$$

8

