



Rep. CD, CI, CO, 2 octeti

1.  $5674 : 2 = 2837$   $\uparrow$   $\pi 0$   
 $2837 : 2 = 1418$   $\pi 1$   
 $1418 : 2 = 709$   $\pi 0$   
 $709 : 2 = 354$   $\pi 1$   
 $354 : 2 = 177$   $\pi 0$   
 $177 : 2 = 88$   $\pi 1$   
 $88 : 2 = 44$   $\pi 0$   
 $44 : 2 = 22$   $\pi 0$   
 $22 : 2 = 11$   $\pi 0$   
 $11 : 2 = 5$   $\pi 1$   
 $5 : 2 = 2$   $\pi 1$   
 $2 : 2 = 1$   $\pi 0$   
 $1 : 2 = 0$   $\pi 1$

$$[X]_D = [x]_I = [x]_C = 0001011000101010$$

2.  $489 : 2 = 244$   $\uparrow$   $\pi 1$   
 $244 : 2 = 122$   $\pi 0$   
 $122 : 2 = 61$   $\pi 0$   
 $61 : 2 = 30$   $\pi 1$   
 $30 : 2 = 15$   $\pi 0$   
 $15 : 2 = 7$   $\pi 1$   
 $7 : 2 = 3$   $\pi 1$   
 $3 : 2 = 1$   $\pi 1$   
 $1 : 2 = 0$   $\pi 1$

$$[X]_D = [x]_I = [x]_C = 0000000111101001$$

$$3. \quad 0,15 \cdot 2 = 0,30 \quad 0,15_{(10)} = 0,001001$$

$$0,30 \cdot 2 = 0,60$$

$$0,60 \cdot 2 = 1,20$$

$$0,20 \cdot 2 = 0,40$$

$$0,40 \cdot 2 = 0,80$$

$$0,80 \cdot 2 = 1,60$$

$$0,60 \cdot 2 = 1,20$$

$$[x]_D = [x]_C = 0001001100110011$$

$$4. \quad 11/16$$

$$11:2 = 5 \text{ п } 1$$

$$5:2 = 2 \text{ п } 1 \Rightarrow 11 = 1011$$

$$2:2 = 1 \text{ п } 0$$

$$1:2 = 0 \text{ п } 1$$

$$\Rightarrow 0101100000000000$$

$$1/16 = 2^{-4}$$

$$5 \quad -945$$

$$945:2 = 472 \text{ п } 1$$

$$472:2 = 236 \text{ п } 0$$

$$236:2 = 118 \text{ п } 0$$

$$118:2 = 59 \text{ п } 0$$

$$59:2 = 29 \text{ п } 1 \Rightarrow 945 = 0000001110110001 \Rightarrow$$

$$29 : 2 = 14 \text{ ת } 1$$

$$14 : 2 = 7 \text{ ת } 0$$

$$7 : 2 = 3 \text{ ת } 1$$

$$3 : 2 = 1 \text{ ת } 1$$

$$1 : 2 = 0 \text{ ת } 1$$

$$\Rightarrow [X]_D = 1000001110110001$$

$$[X]_I = 1111110001001110$$

$$[X]_C = 1111110001001111$$

6. -1897

$$1897 : 2 = 948 \text{ ת } 1$$

$$948 : 2 = 474 \text{ ת } 0$$

$$474 : 2 = 237 \text{ ת } 0$$

$$237 : 2 = 118 \text{ ת } 1$$

$$118 : 2 = 59 \text{ ת } 0$$

$$59 : 2 = 29 \text{ ת } 1$$

$$29 : 2 = 14 \text{ ת } 1$$

$$14 : 2 = 7 \text{ ת } 0$$

$$7 : 2 = 3 \text{ ת } 1$$

$$3 : 2 = 1 \text{ ת } 1$$

$$1 : 2 = 0 \text{ ת } 1$$

$$\Rightarrow [X]_D = 1000011101101001$$

$$[X]_I = 11111100010010110$$

$$[X]_C = 1111100010010111$$

$$7 \quad -0,45 = 0,01(1100)$$

$$0,45 \cdot 2 = 0,90$$

$$0,90 \cdot 2 = 1,80$$

$$0,80 \cdot 2 = 1,60$$

$$0,60 \cdot 2 = 1,20$$

$$0,20 \cdot 2 = 0,40$$

$$0,40 \cdot 2 = 0,80$$

$$[X]_D = 1011100110011001$$

$$[X]_I = 1100011001100110$$

$$[X]_C = 1100011001100111$$

$$8 \quad -9/16 \Rightarrow 9/16 = 0,1001 \Rightarrow x = 0100100000000000$$

$$\begin{array}{l|l} 9:2=4 \text{ r } 1 & \uparrow \\ 4:2=2 \text{ r } 0 & \\ 2:2=1 \text{ r } 0 & \\ 1:2=0 \text{ r } 1 & \end{array} \Rightarrow 9_{(10)} = 1001_{(2)}$$

$$16 = 2^4$$

$$[X]_D = 1100100000000000$$

$$[X]_I = 1011011111111111$$

$$[X]_C = 1011100000000000$$

# Adăugati în CC pe 1 octet. Sumarizati cazurile de depășire

9

$$19 + 26$$

$$19 : 2 = 9 \text{ } \pi 1$$

$$9 : 2 = 4 \text{ } \pi 1$$

$$4 : 2 = 2 \text{ } \pi 0 \Rightarrow 10011_{(2)}$$

$$2 : 2 = 1 \text{ } \pi 0$$

$$1 : 2 = 0 \text{ } \pi 1$$

$$26 : 2 = 13 \text{ } \pi 0$$

$$13 : 2 = 6 \text{ } \pi 1$$

$$6 : 2 = 3 \text{ } \pi 0 \Rightarrow 11010_{(2)}$$

$$3 : 2 = 1 \text{ } \pi 1$$

$$1 : 2 = 0 \text{ } \pi 1$$

$$10011 +$$

$$11010$$

$$00101101, \text{ Nu}$$

10

$$0,81 + 0,73$$

$$0,81 \cdot 2 = 1,62$$

$$0,62 \cdot 2 = 1,24$$

$$0,24 \cdot 2 = 0,48$$

$$0,48 \cdot 2 = 0,96$$

$$0,96 \cdot 2 = 1,92 \Rightarrow 0,81 = 01100111$$

$$0,92 \cdot 2 = 1,84$$

$$0,84 \cdot 2 = 1,68$$

$$0,73 \cdot 2 = 1,46$$

$$0,46 \cdot 2 = 0,92$$

$$0,92 \cdot 2 = 1,84$$

$$0,84 \cdot 2 = 1,68 \Rightarrow 0,73 = 01011101$$

$$0,68 \cdot 2 = 1,36$$

$$0,36 \cdot 2 = 0,72$$

$$0,72 \cdot 2 = 1,44$$

$$1111111$$

$$01100111 +$$

$$01011101$$

$$11000100, \text{ Depășire}$$

11.  $99 + 85$

$$99 : 2 = 49 \text{ } \pi 0$$

$$49 : 2 = 24 \text{ } \pi 1$$

$$24 : 2 = 12 \text{ } \pi 0$$

$$12 : 2 = 6 \text{ } \pi 0$$

$$6 : 2 = 3 \text{ } \pi 0$$

$$3 : 2 = 1 \text{ } \pi 1$$

$$1 : 2 = 0 \text{ } \pi 1$$

$$\Rightarrow 99_{(10)} = 01011110_{(2)}$$

$$85 : 2 = 42 \text{ } \pi 1$$

$$42 : 2 = 21 \text{ } \pi 0$$

$$21 : 2 = 10 \text{ } \pi 1$$

$$10 : 2 = 5 \text{ } \pi 0$$

$$5 : 2 = 2 \text{ } \pi 1$$

$$2 : 2 = 1 \text{ } \pi 0$$

$$1 : 2 = 0 \text{ } \pi 1$$

$$\Rightarrow 85_{(10)} = 01010101 \Rightarrow 85_{(10)} = 10101011_{(2)}$$

$$01011110$$

$$+ 10101011$$

$$\hline$$

$$00001001_{(2)}, Nv$$

12.  $0,51 + -0,76$

$$0,51 \cdot 2 = 1,02$$

$$0,02 \cdot 2 = 0,04$$

$$0,04 \cdot 2 = 0,08$$

$$0,08 \cdot 2 = 0,16$$

$$0,16 \cdot 2 = 0,32$$

$$0,32 \cdot 2 = 0,64$$

$$0,64 \cdot 2 = 1,28$$

$$\Rightarrow 0,51_{(10)} = 01000001$$

$$0,76 \cdot 2 = 1,52$$

$$0,52 \cdot 2 = 1,04$$

$$0,04 \cdot 2 = 0,08$$

$$0,08 \cdot 2 = 0,16$$

$$0,16 \cdot 2 = 0,32$$

$$0,32 \cdot 2 = 0,64$$

$$\Rightarrow 0,76 = 01100001 \Rightarrow -0,76 = 10011111$$

$$0,64 \cdot 2 = 1,28$$

$$\begin{array}{r} 11111 \\ 01000001+ \end{array}$$

$$\begin{array}{r} 1001111 \\ \hline 11100000, N_u \end{array}$$

$$13. -46 + 63$$

$$46 : 2 = 23 \text{ r } 0$$

$$23 : 2 = 11 \text{ r } 1$$

$$11 : 2 = 5 \text{ r } 1$$

$$5 : 2 = 2 \text{ r } 1$$

$$2 : 2 = 1 \text{ r } 0$$

$$1 : 2 = 0 \text{ r } 1$$

$$\Rightarrow 46 = 00101110 \Rightarrow -46 = 11010010$$

$$63 : 2 = 31 \text{ r } 1$$

$$31 : 2 = 15 \text{ r } 1$$

$$15 : 2 = 7 \text{ r } 1$$

$$7 : 2 = 3 \text{ r } 1$$

$$3 : 2 = 1 \text{ r } 1$$

$$1 : 2 = 0 \text{ r } 1$$

$$\Rightarrow 63 = 00111111$$

$$\begin{array}{r} 111111 \\ 11010010+ \end{array}$$

$$00111111$$

$$\hline 00010001, N_u$$

$$14. -0,88 + 0,93$$

$$0,88 \cdot 2 = 1,76$$

$$0,76 \cdot 2 = 1,52$$

$$0,52 \cdot 2 = 1,04$$

$$0,04 \cdot 2 = 0,08$$

$$0,08 \cdot 2 = 0,16$$

$$0,16 \cdot 2 = 0,32$$

$$0,32 \cdot 2 = 0,64$$

$$\Rightarrow 0,88 = 01110000 \Rightarrow -0,88 = 10010000$$



$$0,93 \cdot 2 = 1,86$$

$$0,86 \cdot 2 = 1,72$$

$$0,72 \cdot 2 = 1,44$$

$$0,44 \cdot 2 = 0,88 \Rightarrow 0,93 = 0,1110111$$

$$0,88 \cdot 2 = 1,76$$

$$0,76 \cdot 2 = 1,52$$

$$0,52 \cdot 2 = 1,04$$

$$-0,88 + 0,93 = \begin{array}{r} 111 \\ 10010000 + \\ 01110111 \\ \hline 0000111 \end{array}, N_u$$

15.  $-84 + -79$

$$84 : 2 = 42 \text{ } \pi 0$$

$$42 : 2 = 21 \text{ } \pi 0$$

$$21 : 2 = 10 \text{ } \pi 1$$

$$10 : 2 = 5 \text{ } \pi 0$$

$$5 : 2 = 2 \text{ } \pi 1$$

$$2 : 2 = 1 \text{ } \pi 0$$

$$1 : 2 = 0 \text{ } \pi 1$$

$$\Rightarrow 84 = 01010100 \Rightarrow -84 = 10101100$$

$$79 : 2 = 39 \text{ } \pi 1$$

$$39 : 2 = 19 \text{ } \pi 1$$

$$19 : 2 = 9 \text{ } \pi 1$$

$$9 : 2 = 4 \text{ } \pi 1$$

$$4 : 2 = 2 \text{ } \pi 0$$

$$2 : 2 = 1 \text{ } \pi 0$$

$$1 : 2 = 0 \text{ } \pi 1$$

$$\Rightarrow 79 = 01001111 \Rightarrow -79 = 10110001$$

$$-84 + -79 = \begin{array}{r} 10101100 + \\ 10110001 \\ \hline 01011101 \end{array}, D_a$$

$$16. \quad -0,12 + -0,34$$

$$0,12 \cdot 2 = 0,24$$

$$0,24 \cdot 2 = 0,48$$

$$0,48 \cdot 2 = 0,96$$

$$0,96 \cdot 2 = 1,92$$

$$0,92 \cdot 2 = 1,84$$

$$0,84 \cdot 2 = 1,68$$

$$0,68 \cdot 2 = 1,36$$

$$0,39 \cdot 2 = 0,78$$

$$0,78 \cdot 2 = 1,56$$

$$0,56 \cdot 2 = 1,12$$

$$0,12 \cdot 2 = 0,24$$

$$0,24 \cdot 2 = 0,48$$

$$0,48 \cdot 2 = 0,96$$

$$0,96 \cdot 2 = 1,92$$

$$0,92 \cdot 2 = 1,84$$

$$\Rightarrow 0,12 = 00001111 \Rightarrow -0,12 = 11110001$$

$$\Rightarrow 0,39 = 00101011 \Rightarrow -0,39 = 11010101$$

$$-0,12 + -0,39 = \begin{array}{r} 11110001 \\ 11010101 \\ \hline 11000110 \end{array}, N_u$$

17. Rep virgulă fixă, zecimală, 9 cifre partea întreagă  
+ 1045,67 6 cifre partea fracționară

$$1045 : 2 = 522 \text{ } \pi 1$$

$$522 : 2 = 261 \text{ } \pi 0$$

$$261 : 2 = 130 \text{ } \pi 1$$

$$130 : 2 = 65 \text{ } \pi 0$$

$$65 : 2 = 32 \text{ } \pi 1$$

$$32 : 2 = 16 \text{ } \pi 0$$

$$16 : 2 = 8 \text{ } \pi 0$$

$$8 : 2 = 4 \text{ } \pi 0$$

$$4 : 2 = 2 \text{ } \pi 0$$

$$\Rightarrow 1045 = 10000010101$$

$$\begin{array}{l} 2 : 2 = 1 \text{ r } 0 \\ 1 : 2 = 0 \text{ r } 1 \end{array}$$

$$0,67 \cdot 2 = 1,34$$

$$0,34 \cdot 2 = 0,68$$

$$0,68 \cdot 2 = 1,36$$

$$0,36 \cdot 2 = 0,72$$

$$0,72 \cdot 2 = 1,44$$

$$0,44 \cdot 2 = 0,88$$

0000010101101010

18  $43,12$

$$43 : 2 = 21 \text{ r } 1$$

$$21 : 2 = 10 \text{ r } 1$$

$$10 : 2 = 5 \text{ r } 0 \quad \Rightarrow 43 = 101011$$

$$5 : 2 = 2 \text{ r } 1$$

$$2 : 2 = 1 \text{ r } 0$$

$$1 : 2 = 0 \text{ r } 1$$

$$0,12 \cdot 2 = 0,24$$

$$0,24 \cdot 2 = 0,48$$

$$0,48 \cdot 2 = 0,96$$

$$0,96 \cdot 2 = 1,92 \quad \Rightarrow 0,12 = 000111$$

$$0,92 \cdot 2 = 1,84$$

$$0,84 \cdot 2 = 1,68$$

$$43,12 = 000101011000111$$

$$19 \quad -8097,48$$

$$8097 : 2 = 4048 \text{ ת } 1$$

$$4048 : 2 = 2024 \text{ ת } 0$$

$$2024 : 2 = 1012 \text{ ת } 0$$

$$1012 : 2 = 506 \text{ ת } 0$$

$$506 : 2 = 253 \text{ ת } 0$$

$$253 : 2 = 126 \text{ ת } 1$$

$$126 : 2 = 63 \text{ ת } 0$$

$$63 : 2 = 31 \text{ ת } 1$$

$$31 : 2 = 15 \text{ ת } 1$$

$$15 : 2 = 7 \text{ ת } 1$$

$$7 : 2 = 3 \text{ ת } 1$$

$$3 : 2 = 1 \text{ ת } 1$$

$$1 : 2 = 0 \text{ ת } 1$$

$$\Rightarrow 8097 = 1111110100001$$

$$0,48 : 2 = 0,96$$

$$0,96 : 2 = 1,92$$

$$0,92 : 2 = 1,84$$

$$0,84 : 2 = 1,68$$

$$0,68 : 2 = 1,36$$

$$0,36 : 2 = 0,72$$

$$\Rightarrow 0,48 = 011110$$

$$-8097,48 = 1110100001011110$$

$$20 \quad -12,03$$

$$12 : 2 = 6 \text{ ת } 0$$

$$6 : 2 = 3 \text{ ת } 0$$

$$3 : 2 = 1 \text{ ת } 1$$

$$1 : 2 = 0 \text{ ת } 1$$

$$\Rightarrow 12 = 1100$$

$$0,03 : 2 = 0,06$$

$$0,06 : 2 = 0,12$$

$$\begin{aligned}
 0,12 \cdot 2 &= 0,24 \\
 0,24 \cdot 2 &= 0,48 \\
 0,48 \cdot 2 &= 0,96 \\
 0,96 \cdot 2 &= 1,92
 \end{aligned}
 \Rightarrow 0,03 = 000001$$

1000001100000001

21 Rep virgulă mobilă, CD, mantisă subunitară

5941,36

$$\begin{aligned}
 5941 : 2 &= 2970 \text{ } \pi 1 \\
 2970 : 2 &= 1485 \text{ } \pi 0 \\
 1485 : 2 &= 742 \text{ } \pi 1 \\
 742 : 2 &= 371 \text{ } \pi 0 \\
 371 : 2 &= 185 \text{ } \pi 1 \\
 185 : 2 &= 92 \text{ } \pi 1 \\
 92 : 2 &= 46 \text{ } \pi 0 \\
 46 : 2 &= 23 \text{ } \pi 0 \\
 23 : 2 &= 11 \text{ } \pi 1 \\
 11 : 2 &= 5 \text{ } \pi 1 \\
 5 : 2 &= 2 \text{ } \pi 1 \\
 2 : 2 &= 1 \text{ } \pi 0 \\
 1 : 2 &= 0 \text{ } \pi 1
 \end{aligned}$$

$$\Rightarrow 1011100110101$$

$$\begin{aligned}
 0,36 \cdot 2 &= 0,72 \\
 0,72 \cdot 2 &= 1,44 \\
 0,44 \cdot 2 &= 0,88 \\
 0,88 \cdot 2 &= 1,76 \\
 0,76 \cdot 2 &= 1,52 \\
 0,52 \cdot 2 &= 1,04 \\
 0,04 \cdot 2 &= 0,08 \\
 0,08 \cdot 2 &= 0,16 \\
 0,16 \cdot 2 &= 0,32 \\
 0,32 \cdot 2 &= 0,64
 \end{aligned}$$

$$\Rightarrow 0,36 = 01011100001$$

$$0,64 \cdot 2 = 1,28$$

$$E = 13$$

$$C = 127 + 13 = 140$$

$$140 : 2 = 70 \quad \text{н0}$$

$$70 : 2 = 35 \quad \text{н0}$$

$$35 : 2 = 17 \quad \text{н1}$$

$$17 : 2 = 8 \quad \text{н1}$$

$$8 : 2 = 4 \quad \text{н0}$$

$$4 : 2 = 2 \quad \text{н0}$$

$$2 : 2 = 1 \quad \text{н0}$$

$$1 : 2 = 0 \quad \text{н1}$$

$$\Rightarrow 140 = 10001100$$

01000110010111001101010101110000

Sign Characteristica                      mantissa

$$2^m$$

$$10 -$$

$$10$$

$$X = 0,011011$$

$$1,111111$$

$$0,011011$$

$$1,100100$$

$$2^{-m+1}$$

$$1,0101010101010101$$

$$0,00000001$$

$$1,1111110$$