

Computer Systems – Activities answers

# UNIT 02. INFORMATION REPRESENTATION



Computer Systems  
CFGs DAW

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## Licencia



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## Nomenclatura

A lo largo de este tema se utilizarán distintos símbolos para distinguir elementos importantes dentro del contenido. Estos símbolos son:

🔔 Actividad opcional. Normalmente hace referencia a un contenido que se ha comentado en la documentación por encima o que no se ha hecho, pero es interesante que le alumno investigue y practique. Son tipos de actividades que entran para examen

👁 Atención. Hace referencia a un tipo de actividad donde los alumnos suelen cometer equivocaciones.

## UNIT 02. INFORMATION REPRESENTATION

### Activities

(1) Convert to decimal the following values:

- |                 |                   |                 |                       |                 |
|-----------------|-------------------|-----------------|-----------------------|-----------------|
| a) $1001_{(2)}$ | b) $110010_{(2)}$ | c) $1010_{(2)}$ | d) $100101,101_{(2)}$ | e) $1011_{(2)}$ |
| a) 9            | b) 50             | c) 10           | d) 37,625             | e) 11           |

(2) Convert to binary the following values:

- |               |                 |                    |                 |                     |
|---------------|-----------------|--------------------|-----------------|---------------------|
| a) $8_{(10)}$ | b) $512_{(10)}$ | c) $20,625_{(10)}$ | d) $255_{(10)}$ | e) $3560,75_{(10)}$ |
| a) 1000       | b) 1000000000   | c) 10100,101       | d) 11111111     | e) 110111101000,11  |

(3) Convert to hex the following values:

- |                      |                       |                    |                  |
|----------------------|-----------------------|--------------------|------------------|
| a) $100100101_{(2)}$ | b) $1000000000_{(2)}$ | c) $1001001_{(2)}$ | d) $11111_{(2)}$ |
| a) 125               | b) 200                | c) 49              | d) 1F            |

(4) Convert to binary the following values:

- |                    |                     |                 |                 |
|--------------------|---------------------|-----------------|-----------------|
| a) $5A43_{(16)}$   | b) $BEA_{(16)}$     | c) $23A_{(16)}$ | d) $100_{(16)}$ |
| a) 101101001000011 | b) 101111101010     | c) 1000111010   | d) 100000000    |
| e) $F410_{(16)}$   | e) 1111010000010000 |                 |                 |

(5) Convert to octal the following values:

- |                   |                  |                   |                |                     |
|-------------------|------------------|-------------------|----------------|---------------------|
| a) $100101_{(2)}$ | b) $11101_{(2)}$ | c) $110011_{(2)}$ | d) $100_{(2)}$ | e) $11010101_{(2)}$ |
| a) $45_{(8)}$     | b) $35_{(8)}$    | c) $63_{(8)}$     | d) $4_{(8)}$   | e) $325_{(8)}$      |

(6) Convert to binary the following values:

- |                |                 |                |                 |                |
|----------------|-----------------|----------------|-----------------|----------------|
| a) $521_{(8)}$ | b) $1234_{(8)}$ | c) $100_{(8)}$ | d) $7543_{(8)}$ | e) $111_{(8)}$ |
| a) 101010001   | b) 1010011100   | c) 1000000     | d) 111101100011 | e) 1001001     |

(7) Convert to decimal the following values:

- a)  $F2A3_{(16)}$       b)  $4227_{(16)}$       c)  $4227_{(8)}$       d)  $AAFF_{(16)}$   
a) 62115      b) 16935      c) 2199      d) 43775

(8) Convert to hex the following values:


- a)  $16_{(10)}$       b)  $427_{(10)}$       c)  $255_{(10)}$       d)  $534_{(10)}$   
a) 10      b) 1AB      c) FF      d) 216

(9) Convert to octal the following values:

- a)  $16_{(10)}$       b)  $427_{(10)}$       c)  $255_{(10)}$       d)  $534_{(10)}$   
a) 20      b) 653      c) 377      d) 1026

(10) Add the numbers  $45 + 31$  in binary code. Check the result by performing the conversion to decimal.

*1001100*

(11)  Subtract the numbers  $80 - 46$  in binary code. Check the result by performing the conversion to decimal.

*100010*

(12) Subtract the numbers  $109 - 23$  in binary code. Check the result by performing the conversion to decimal.

*1010110*

(13) Multiply the numbers  $30 * 6$  in binary code. Check the result by performing the conversion to decimal.

*10110100*

(14) What is the negative representation of 58 in binary code? Give the result in sign and magnitude, 1's complement, 2's complement and Excess-K with  $K = 2^{n-1}$ , all for a value of 8-bit word.

- a) 10111010      b) 11000101      c) 11000110      d) 01000110

(15) What is the decimal value of 10101010 if it is represented using Excess-K with  $K = 2^{n-1}$ ?

42

(16) Perform the following logical operations:

- a) NOT (10001001 OR 10111001)                      b) 11011011 XOR 10111001  
c) 00000111 AND 11111111                      d) 00000111 XOR 11111111  
a) 01000110                      b) 1100010                      c) 00000111                      d) 11111000

(17) 👁 How many bits I need to represent the number 62?

6

(18) 👁 With a 12 bits binary number, how many numbers can we represent?

4096

(19) What is UNICODE? How many bits use it to encode?

You can find information about this question in:

<http://www.unicode.org/standard/translations/spanish.html>

<http://informaticamejoras.blogspot.com.es/2009/11/unicode.html>

(20) Encode in decimal, octal and hex the phrase "Sistemas de representación" using the ASCII

DEC: 83 105 115 116 101 109 97 115 32 100 101 32 114 101 112 114 101 115 101 110  
116 97 99 105 162 110

HEX: 53 69 73 74 65 6D 61 73 20 64 65 20 72 65 70 72 65 73 65 6E 74 61 63 69 A2  
6E


OCT: 123 151 163 164 145 155 141 163 40 144 145 40 162 145 160 162 145 163 145 156  
164 141 143 151 242 156

(21) 👁 What is the decimal value of C19E0000? The number is represented using 32 bits IEEE754

-19.75

(22) Perform the following conversions:

- a) 34 TB → MB                      b) 1200 GB → EB                      c) 👁 100 Mb → kB                      d) 👁 6Mb/s → GB/week  
a) 34000000 MB                      b) 0,0000012 EB                      c) 12500 Mb → kB                      d) 453,6 GB/Week

(23)  Divide the numbers 105/5 in binary code. Check the result by performing the conversion to decimal.

105:	1101001	1101001	<u>101</u>	
5:	101	101	10101	= 21
		00110		
		101		
		00101		
		101		
		000		