Computer Systems – Activities answers

UNIT 02. INFORMATION REPRESENTATION

Computer Systems
CFGS DAM/DAW

Sergio García / Alfredo Oltra

2022/2023

Versión:220911.2029

Licencia

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) Substract 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      |101
5:   101              101           10101    = 21
                      00110
                        101
                        00101
                          101
                          000
```