Chapter 3 Number Systems

1) How many binary digits does it take to represent the decimal number 2013?

a) 16

b) 8

**c) 11**

d) 2013

2) How many bytes does it take to store the binary equivalent of the decimal number 1945?

a) 1

**b) 2**

c) 4

d) 10

3) The largest number that can be represented 8 bits without considering a sign is

a) 15

**b) 255**

c) 65,535

d) 10,000,000

4) The largest single digit in octal is

a) 1

**b) 7**

c) 8

d) 10

5) The largest single digit in hexadecimal is

a) 1

b) 8

**c) F**

d) 9

6) The binary number 101100112 is equivalent to the decimal number

a) 113

**b) 179**

c) 133

d) 10,110,011

7) Eight raised to the power zero is

a) 0

**b) 1**

c) 8

d) -8

8) Eight raised to the power one is

a) 0

b) 1

**c) 8**

d) -8

9) The number of different items that can be represented by a given number of digits, *n*, in a particular base, *b*, is given by the formula: $b^{n}$ equals \_\_\_\_\_\_\_\_\_\_\_\_\_.

a) field

b) radix

**c) range**

d) parameter

10) The digit with the greatest weight (value) in a number is called the

a) radix

b) heaviest bit

c) least significant digit

**d) most significant digit**

11) The octal number 128 is equivalent to the decimal number

a) 9

**b) 10**

c) 24

d) 12

12) The hexadecimal number 1A16 is equivalent to the decimal number

a) 9

b) 17

**c) 26**

d) 110

13) How many bits are there in one byte?

a) 1

b) 4

**c) 8**

d) 10

14) A single digit that can have only one of two values, 0 or 1, is a

**a) bit**

b) blip

c) signal

d) character

15) In order to divide a number by its base we can perform

a) a bit op

b) a left shift

**c) a right shift**

d) a complex equation

16) In order to multiply a number by its base we can perform

a) a bit op

**b) a left shift**

c) a right shift

d) a complex equation

17) The base 8 number system is called

**a) octal**

b) fractal

c) ochodecimal

d) hexadecimal

18) The base 2 number system is called

**a) binary**

b) fractal

c) bitly

d) radix

19) Which of the following is true?

a) 12 <18

b) 102 < 18

**c) 1012 < 108**

d) 1012 < 58

20) Which of the following is true?

**a) 0.12  > 0.18**

b) 0.12 = 0.18

c) 0.12 < 0.18

d) None of these

21) Which of the following is true?

a) 1018 <1016

b) 108 < 116

**c) 118 < 1016**

d) 128 < A16

22) The “Exclusive OR” function (used for the result bit when adding single digits in binary) will equal 1 if the input bits are

a) 0+0

**b) 0+1**

c) 1+1

d) None of these

23) The “AND” function (used for the carry bit when adding single digits in binary) will equal 1 if the input bits are

a) 0+0

b) 0+1

**c) 1+1**

d) None of these

24) The decimal number 9 is equivalent to the hexadecimal

a) A

**b) 9**

c) 10

d) 1001

25) The base 16 number system is called

a) octal

b) fractal

c) sextadecimal

**d) hexadecimal**

26) To convert from binary to octal by grouping, one octal digit corresponds to how many binary digits?

a) one

b) two

**c) three**

d) eight

27) To convert from binary to hexadecimal by grouping, one hexadecimal digit corresponds to how many binary digits?

a) two

**b) four**

c) eight

d) sixteen

28) Ten raised to the power negative one (10-1) is

**a) 1/10**

b) -10

c) -1/10

d) None of these

29) The binary number 10**.**012 is equivalent in decimal to

a) 2.01

**b) 2.25**

c) 4.25

d) 10.01

30) The octal number 1**.**28 is equivalent in decimal to

**a) 1.25**

b) 8.16

c) 8.25

d) 12

31) The hexadecimal number B**.**416 is equivalent in decimal to

a) 10.25

b) 10.5

**c) 11.25**

d) None of these

32) The decimal fraction ¼ (0.25) is equivalent to

a) 0.12

b) 0.18

c) 0.116

**d) None of these**

33) The digit furthest to the right is usually the

a) radix

b) lightest bit

**c) least significant digit**

d) most significant digit

34) The number of different digits, including zero, that exist in the number system is the

a) range

b) field

**c) base**

d) parameter

35) The number point (normally known by the name of the base—for example "decimal point" in base 10)—which divides whole numbers from fractional numbers is called

a) bit point

**b) radix point**

c) fractal point

d) division point

**Analytic questions (There are no discussion questions for this chapter)**

1) Convert this binary number 1010110102 to Decimal.

**Sol: 346**

2) Convert this binary number 1010110102 to Octal.

**Sol: 532**

3) Convert this binary number 1010110102 to Hexadecimal.

**Sol: 15A**

4) Show the decimal number 147 in Binary.

**Sol: 10010011**

5) Show the decimal number 147 in Octal.

**Sol: 223**

6) Show the decimal number 147 in Hexadecimal.

**Sol: 93**

7) Convert this hexadecimal number 5D316 to Binary.

**Sol: 10111010011**

8) Convert this hexadecimal number 5D316 to Octal.

**Sol: 2723**

9) Convert this hexadecimal number 5D316 to Decimal.

**Sol: 1491**

10) Convert this octal number 12348 to Decimal.

**Sol: 668**

11) Convert this octal number 12348 to Binary.

**Sol: 1010011100**

12) Convert this octal number 12348 to Hexadecimal.

**Sol: 29C**

13) Show the decimal number 5.25 in Binary.

**Sol: 101.01**

14) Convert the binary number 1.1012 to decimal.

**Sol: 1.625**

15) Addition: Show 42 + 3 in binary--explaining each time you add and carry (Show your work for credit). Hint: Make a table with powers of 2 as column headings and make the first row equal to the binary value for decimal 42; make the next row binary 3, then add column by column for the total in last row.

**Sol:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  |
| **0** | **0** | **1** | **0** | **1** | **0** | **1** | **0** | **42** |
| **0** | **0** | **0** | **0** | **0** | **0** | **1** | **1** | **3** |
| **0** | **0** | **1** | **0** | **1** | **1** | **0 (carry 1)** | **1** | **45** |

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| Problem | Answer | Section in text / comments |
| 1 | c | Section 3.1 Numbers as a Physical Representation |
| 2 | b | Section 3.1 Numbers as a Physical Representation |
| 3 | b | Section 3.2 Counting in Different Bases |
| 4 | b | Section 3.2 Counting in Different Bases |
| 5 | c | Section 3.2 Counting in Different Bases |
| 6 | b | Section 3.2 Counting in Different Bases |
| 7 | b | Section 3.2 Counting in Different Bases |
| 8 | c | Section 3.2 Counting in Different Bases |
| 9 | c | Section 3.2 Counting in Different Bases |
| 10 | d | Section 3.2 Counting in Different Bases |
| 11 | b | Section 3.3 Performing Arithmetic in Different Number Bases |
| 12 | c | Section 3.3 Performing Arithmetic in Different Number Bases |
| 13 | c | Section 3.3 Performing Arithmetic in Different Number Bases |
| 14 | a | Section 3.3 Performing Arithmetic in Different Number Bases |
| 15 | c | Section 3.3 Performing Arithmetic in Different Number Bases |
| 16 | b | Section 3.3 Performing Arithmetic in Different Number Bases |
| 17 | a | Section 3.3 Performing Arithmetic in Different Number Bases |
| 18 | a | Section 3.3 Performing Arithmetic in Different Number Bases |
| 19 | c | Section 3.3 Performing Arithmetic in Different Number Bases |
| 20 | a | Section 3.3 Performing Arithmetic in Different Number Bases |
| 21 | c | Section 3.3 Performing Arithmetic in Different Number Bases |
| 22 | b | Section 3.3 Performing Arithmetic in Different Number Bases |
| 23 | c | Section 3.3 Performing Arithmetic in Different Number Bases |
| 24 | b | Section 3.5 Hexadecimal Numbers and Arithmetic |
| 25 | d | Section 3.5 Hexadecimal Numbers and Arithmetic |
| 26 | c | Section 3.6 A Special Conversion Case—Number Bases That Are Related |
| 27 | b | Section 3.6 A Special Conversion Case—Number Bases That Are Related |
| 28 | a | Section 3.7 Fractions |
| 29 | b | Section 3.7 Fractions |
| 30 | a | Section 3.7 Fractions |
| 31 | c | Section 3.7 Fractions |
| 32 | d | Section 3.7 Fractions |
| 33 | c | Section 3.7 Fractions |
| 34 | c | Section 3.7 Fractions |
| 35 | d | Section 3.7 Fractions |