

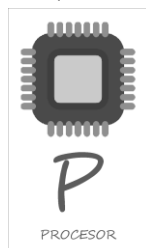
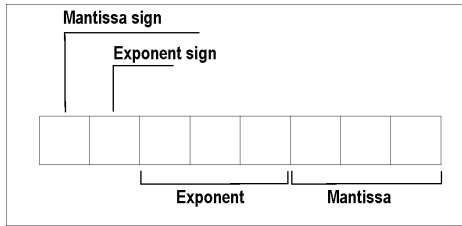
| Information units                                | Table of 2 <sup>n</sup> powers | Conversion table octal – binary |        |
|--------------------------------------------------|--------------------------------|---------------------------------|--------|
|                                                  |                                | Octal                           | binary |
| 1 bit – elementary unit                          | 2 <sup>1</sup> = 2             |                                 |        |
| 1B (Byte) = 8 bit                                | 2 <sup>2</sup> = 4             |                                 |        |
| 1KB (Kilo Byte) = 2 <sup>10</sup> B (≈ 1000 B)   | 2 <sup>3</sup> = 8             | 0                               | 000    |
| 1MB (Mega Byte) = 2 <sup>10</sup> KB (≈ 1000 KB) | 2 <sup>4</sup> = 16            | 1                               | 001    |
| 1GB (Giga Byte) = 2 <sup>10</sup> MB (≈ 1000 MB) | 2 <sup>5</sup> = 32            | 2                               | 010    |
| 1TB (Tera Byte) = 2 <sup>10</sup> GB (≈ 1000 GB) | 2 <sup>6</sup> = 64            | 3                               | 011    |
|                                                  | 2 <sup>7</sup> = 128           | 4                               | 100    |
|                                                  | 2 <sup>8</sup> = 256           | 5                               | 101    |
|                                                  |                                | 6                               | 110    |
|                                                  |                                | 7                               | 111    |

#### HTML codes for Romanian letters:

| Literă | Ă     | ă     | Â      | â      | Î      | î      | Ș     | ș     | Ț     | ț     |
|--------|-------|-------|--------|--------|--------|--------|-------|-------|-------|-------|
| Cod    | &#258 | &#259 | &Acirc | &acirc | &Icirc | &icirc | &#350 | &#351 | &#354 | &#355 |

#### Memory allocation in Turbo Pascal 7.0

| Type        | Bytes                             |
|-------------|-----------------------------------|
| integer     | 2                                 |
| real        | 6                                 |
| boolean     | 1                                 |
| char        | 1                                 |
| enumeration | 1                                 |
| interval    | In correspondence with basic type |
| reference   | 4                                 |
| string      | 256                               |

| Nr                                  | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Points                                              |                                                     |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|-------|-------------------------------------|--|---------|-------------------------------------|---------|-------------------------------------|---------|--|---------|----------------------------|----------------------------|
| 1.                                  | <p>The set for learning the alphabet and numbers contains 44 cards with distinct symbols (31 letters, 10 digits and signs "+", "-", "="). The set is considered to be a messages source, cards - messages.</p> <p>a) Calculate and write in the reserved space the minimal length of binary words of equal length, necessary for univocal encoding of messages.</p> <p style="text-align: right;"><b>Answer:</b> _____ (bit)</p> <p>Write used formulas and calculations:</p> <p style="text-align: right;"><i>Image 1</i></p>  <p>b) Considering the card as being an image, calculate and write in the reserved space the quantity of information from image in KB (<i>Image 1</i>). Card dimensions: 5 x 10 cm; image is represented using a raster of 64 de dots/cm; image is color, with 3 primary colors, 256 levels of luminosity each.</p> <p style="text-align: right;"><b>Answer:</b> _____ (KB)</p> <p>Write used formulas and calculations:</p> | L<br>0<br>1<br>2<br>3<br>4                          | L<br>0<br>1<br>2<br>3<br>4                          |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |
| 2.                                  | <p>a) Convert to decimal the binary number <math>(11001,01)_2</math>. Write the result in the reserved space:</p> <p style="text-align: right;"><b>Answer:</b> ( _____ )<sub>10</sub></p> <p>Write calculations:</p> <p>b) Convert to octal the binary number <math>(10100,01)_2</math>. Write the result in the reserved space:</p> <p style="text-align: right;"><b>Answer:</b> ( _____ )<sub>8</sub></p> <p>Write calculations:</p> <p>c) Write in the cassette on the right the representation of the real binary number <math>(10,1)_2</math> on 8 binary positions in exponent-mantissa format:</p>                                                                                                                                                                                                                                                                                                                                                  | L<br>0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9 | L<br>0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9 |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |
| 3.                                  | <p>a) Connect with lines <i>Internet numerical addresses</i> from the left column of the table below with corresponding <i>class address</i> from the right column:</p> <table><tr><th>Numerical address</th><th></th><th>Class</th></tr><tr><td>10110000 00011000 00000001 10000001</td><td rowspan="4"></td><td>Class A</td></tr><tr><td>11010001 00011000 00000001 10001100</td><td>Class B</td></tr><tr><td>00101001 00011010 00000001 10001101</td><td>Class C</td></tr><tr><td></td><td>Class D</td></tr></table> <p>b) Check the correct name of a <i>specialized computer</i> for interconnection of two networks that use the same communication protocols:</p> <p><input type="checkbox"/> Host                      <input type="checkbox"/> Gateway                      <input type="checkbox"/> Router</p>                                                                                                                                                                                                                       | Numerical address                                   |                                                     | Class | 10110000 00011000 00000001 10000001 |  | Class A | 11010001 00011000 00000001 10001100 | Class B | 00101001 00011010 00000001 10001101 | Class C |  | Class D | L<br>0<br>1<br>2<br>3<br>4 | L<br>0<br>1<br>2<br>3<br>4 |
| Numerical address                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Class                                               |                                                     |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |
| 10110000 00011000 00000001 10000001 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Class A                                             |                                                     |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |
| 11010001 00011000 00000001 10001100 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Class B                                             |                                                     |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |
| 00101001 00011010 00000001 10001101 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Class C                                             |                                                     |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |
|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Class D                                             |                                                     |       |                                     |  |         |                                     |         |                                     |         |  |         |                            |                            |



6

There are two numeric codes, associated to a credit card. The basic, PIN code, is a 4 digit number. The PUK (Personal Unlocking Key) code is a 3 digit number. This code is used to restore access to credit card if incorrect PIN code was entered more times. One of criteria of acceptance of PUK code is that its sum of digits must be a divisor of sum of digits from the PIN code.

**Task:** Write a program, which will verify if the PUK code corresponds to the acceptance criteria for a given PIN code. The program will contain a subprogram, which will receive an integer number N as a parameter and will return the sum of digits of that number.

**Input:** The text file CODE.IN contains in the first line an unsigned integer number of 3 digits: PUK code. The second line contains an unsigned integer number of 4 digits: PIN code.

**Output:** The text file CODE.OUT contains a single line in which the word "ACCEPTAT" is written if the PUK code corresponds to the acceptance criteria, or "RESPINS" otherwise.

Example:

| CODE . IN | CODE . OUT | Explication |
|-----------|------------|-------------|
| 251       | ACCEPTAT   | 2+5+1=8     |
| 2455      |            | 2+4+5+5=16  |
| 078       | RESPINS    | 0+7+8=15    |
| 4864      |            | 4+8+6+4=22  |

The Task will be appreciated for:

description of data types and variables  
declaration; operation with text files; data  
reading and writing; the algorithm  
organization.

L

0

1

2

3

4

5

6

7

8

9

L

0

1

2

3

4

5

6

7

8

9

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                           |                                           |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------|
| 7 | <p>A drone patrolling a rectilinear segment of the highway. After a fault, drone began an uncontrolled landing parallel to the highway. The landing occurs by the trajectory, described by the function <math>f(x) = \cos(x) - 0,5x + 7</math>. In the contact point with the ground <math>f(x) = 0</math>.</p> <p>Write a program that will find the abscissa of the contact point, computing the equation <math>f(x) = 0</math> on the segment <math>[10, 15]</math> using the method of bisection with an error less or equal to 0,0001.</p> <p><b>Input:</b> Values of extreme points of <math>[a,b]</math> and admissible error value will be fixed directly in the program code.</p> <p><b>Output:</b> On the screen will be shown one number: the root of the equation <math>f(x) = 0</math> on the segment <math>[10, 15]</math>.</p> | L<br>0<br>1<br>2<br>3<br>4<br>5<br>6<br>7 | L<br>0<br>1<br>2<br>3<br>4<br>5<br>6<br>7 |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------|

**Note:** The following algorithm can be used to solve the equation:

1. While  $|a - b| > \varepsilon$ :

a)  $c \leftarrow (a + b) / 2$

b) if  $f(c) = 0$  then  $a \leftarrow b$  else,  
if  $f(c) \times f(a) > 0$  then  $a \leftarrow c$  else  $b \leftarrow c$

2. Output  $c$

- 8 The database for evidence of the worked days was created in MS Access. The current content of the database tables is presented in the *Image 2*.

The screenshot shows three tables from a Microsoft Access database:

- Colaboratori : Table**

|   | Cod_C | Nume       | Prenume  | Data_nasterii | Cod_F |
|---|-------|------------|----------|---------------|-------|
| + | 1     | Eremia     | Ion      | 15.06.1973    | F09   |
| + | 2     | Vangheli   | Mircea   | 12.12.1978    | F09   |
| + | 3     | Ursu       | Ana      | 18.08.1981    | F01   |
| + | 4     | Mocrac     | Sergiu   | 26.08.1985    | F02   |
| + | 5     | Spataru    | Vasile   | 14.12.1984    | F01   |
| + | 6     | Pintilie   | Dragos   | 15.08.1975    | F10   |
| + | 7     | Reabov     | Nicolae  | 24.11.1988    | F06   |
| + | 8     | Mazur      | Cornel   | 22.12.1984    | F04   |
| + | 9     | Doroftei   | Stela    | 05.07         |       |
| + | 10    | Ghimp      | Ana      | 08.11         |       |
| + | 11    | Gheorghiev | Maria    | 19.07         |       |
| + | 12    | Andronic   | Stefan   | 14.06         |       |
| + | 13    | Vaculov    | Roman    | 12.11         |       |
| + | 14    | Caraman    | Ana      | 26.05         |       |
| + | 15    | Munteanu   | Eliza    | 21.07         |       |
| + | 16    | Rotari     | Marius   | 04.03         |       |
| + | 17    | Cibotaru   | Nicolae  | 01.04         |       |
| + | 18    | Gaidarji   | Petru    | 12.03         |       |
| + | 19    | Mereacre   | Elena    | 24.07         |       |
| + | 20    | Banari     | Gheorghe | 17.05         |       |
- Pontaj : Table**

|  | Cod  | Cod_C | Zile_lucrate |
|--|------|-------|--------------|
|  | P001 | 1     | 21           |
|  | P002 | 2     | 22           |
|  | P003 | 3     | 21           |
|  | P004 | 9     | 22           |
|  | P005 | 14    | 18           |
|  | P006 | 20    | 20           |
|  | P007 | 6     | 19           |
|  | P008 | 12    | 22           |
|  | P009 | 7     | 21           |
- Functii : Table**

|  | Cod_F | Funcctie             | Salariul (lei) |
|--|-------|----------------------|----------------|
|  | F01   | Se-fechipa           | 18000          |
|  | F02   | Tester superior      | 10000          |
|  | F03   | Tester               | 8000           |
|  | F04   | Programator superior | 15900          |
|  | F05   | Programator          | 12000          |
|  | F06   | Designer Web         | 10000          |
|  | F07   | Operator             | 6000           |
|  | F08   | Administrator Retea  | 9000           |
|  | F09   | Administrator BD     | 16000          |
|  | F10   | Analist              | 16000          |

Image 2

- a) Based on the database content, shown in the *Image 2*, check the value of Truth for the sentence: "The type of the field *Salariul* from the table *Functii* can be *Number*."
- ☐ True ☐ False
- b) Check in the following list field types which have the propriety *Allow Zero Length*:
- ☐ Date/time ☐ AutoNumber ☐ Text ☐ Ole Object
- c) Complete in *Image 3* all necessary elements, to define in *Design View* a **calculated field query**, such that:
- The query will contain **4 fields**: *Cod\_C*, *Plata*, *Cod\_F*, *Zile\_lucrate*;
  - The query will show **2 fields**: *Cod\_C* and *Plata*, sorted ascending by *Cod\_C*. (*Plata* - **calculated field**, which will show the sum of base employee salary (Field *Salariul*) and a supplement of 800 lei);
  - The codes of all employees (field *Cod\_C*), what worked **not less than 20 days** or are working as **operator**, regardless of the number of worked days will be shown;

The screenshot shows the Query Design View for 'Query1 : Select Query'. It includes three tables: **Functii**, **Colaboratori**, and **Pontaj**.

- Functii** table fields: *Cod\_F*, *Funcctie*, *Salariul (lei)*.
- Colaboratori** table fields: *Cod\_C*, *Nume*, *Prenume*, *Data\_nasterii*, *Cod\_F*.
- Pontaj** table fields: *Cod*, *Cod\_C*, *Zile\_lucrate*.

Below the table list is a grid for defining the query fields and criteria:

| Field:    |                          |                          |                          |                          |
|-----------|--------------------------|--------------------------|--------------------------|--------------------------|
| Table:    |                          |                          |                          |                          |
| Sort:     |                          |                          |                          |                          |
| Show:     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Criteria: |                          |                          |                          |                          |
| or:       |                          |                          |                          |                          |

Image 3

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                           |                                                           |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| 9 | <p>Let the HTML document source is given.</p> <pre> &lt;html&gt; &lt;body&gt;   &lt;table border=1&gt;     &lt;tr&gt;&lt;td colspan=2 align=center &gt; Limbaje de programare &lt;/td&gt; &lt;/tr&gt;     &lt;tr&gt;&lt;td rowspan=2 valign=middle&gt; Limbaje de nivel &amp;icirc;nalt&lt;/td&gt;     &lt;td&gt; Compilatoare:       &lt;ol type=I&gt;         &lt;li&gt; Pascal         &lt;li&gt; C++         &lt;li&gt; C#       &lt;/ol&gt;     &lt;/td&gt; &lt;/tr&gt;     &lt;tr&gt; &lt;td&gt; Interpretatoare       &lt;/td&gt; &lt;/tr&gt; &lt;/table&gt; &lt;/body&gt; &lt;/html&gt; </pre> <p>Write in the bottom the result of interpretation of HTML code by the browser.</p> | L<br>0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10 | L<br>0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10 |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|