Slovenian Matura in Computer Science (Informatics) 2012

Examination Part 1

90 min

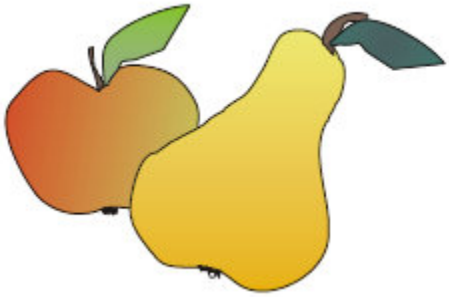
1. In a list of programs circle the application software. (2 points)
   A. Text editor Wordpad.
   B. Driver for printer.
   C. Program Telnet.
   D. OS Windows 7.
   E. Drawing program CorelDraw.
   F. Program Winzip for compressing files.
2. Circle two statements, which are true for digital (discrete) presentation of amount. (2 points)
   A. Codomain of amount is infinite.
   B. Between the two values we can always read the intermediate value.
   C. The amount is represented with values, which are written with integers.
   D. The amount is represented with values, which are written with two decimals.
3. Circle two correct statements. (2 points)
   A. Computer science is researching different kinds and properties of information, their legality and theory, and any activity connected to information.
   B. Program is sequence of any instructions.
   C. Electronic scales show the data in digital form.
   D. When we shut down the computer, the data written in ROM are preserved.
4. Why is written knowledge important? Circle three correct answers. (2 points)
   A. With integration of written knowledge the knowledge expands.
   B. For the usage of written knowledge we don't need any preknowledge and that is why it is accessible to anyone.
   C. Written knowledge enables the transfer of knowledge without personal contact.
   D. With written knowledge we can avoid forgetting.
   E. Written knowledge is always true.
5. Circle the correct statement. (2 points)
   A. Information technology is a unit of procedures and accessories for processing, saving and intercession of information.
   B. Information technology is a unit of procedures and accessories for processing, saving and intercession of the data.
   C. Information technology produces information.
   D. Information technology is based only on computer technology.
6. What is typical for structured programming? (Circle the most suitable statement) (2points)
   A. The programmer does not predict how the program will run from the start to the end during programming.
   B. More complex problem is dissected to subproblems.
   C. Basic element of structured programming is class.
   D. We use only data structures.

7. Connect the relevant terms to each other; fill in the second row of the table with the letter in second column. (2 points)

1. Model of reality	A. Attribute
2. Relation	B. Database
3. Primary key	C. Relational data model
4. Logical data model	D. Model E-R
5. Conceptual data model	E. Table

1.	2.	3.	4.	5.

8. Write, how do we divide computers by data formats. (2 points)
9. Circle the answers, which are correct for vector graphics. (2 points)



   A. I can delete the pear leaf and paint it with different color.
   B. I can get this picture with a scanner.
   C. I can drag the apple to the other side of drawing.
   D. Each fruit can be resized independently.
   E. The picture is made with program Paint.
   F. I can rotate pear leaf by any angle.
10. Among the areas of artificial intelligence there is also computer cognition. Circle two correct answers, which belong to computer cognition. (2 points)
   A. Representation of the knowledge with rules.
   B. Recognition of natural language.
   C. Computer vision.
   D. Machine learning.
11. Write the main job of information system. (2 points)
12. In an encoding table ASCII, the character B is coded as $66_{(10)}$. Write the code of character K in this table. (2points)
13. When is the communication one-way and when is it two-way? (2 points)
14. Write down three interruptions, which can occur when listening to lectures. (2 points)
15. What is the code for color model, which is used for representing colors on computer display? (2 points)

There is a list of computer parts:

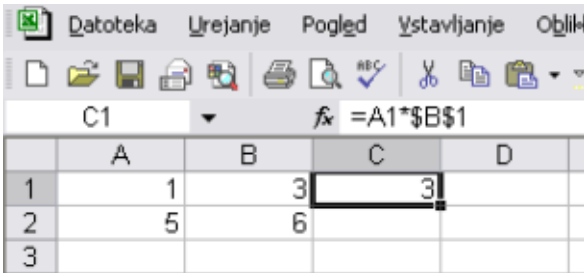
A. Mouse
B. USB stick
C. LCD display
D. Plotter
E. DVD disc
F. Graphic tablet

G. Processor
H. Register
I. Camera
J. Projector

16.1. Divide the parts of computer to proper columns, where you fill in the letters. (4 points)

Input	Output	Central processing unit	Secondary memory

17. Janko made his website on school computer and saved it to school server. On a home computer he found out, that there is no "Č", "Š", "Ž" on the website. In school that was not a problem.
    17.1. Why these problems occur? (2 points)
    17.2. How can he fix this? (2 points)
18. The amount of information depends on various factors.
    18.1. Write two factors that determine how available options effect on amount of information. (4 points)
19. Information system consists of several elements.
    19.1. List all six elements. (4 points)
20. The amount of information is measured in bits.
    20.1. How many bits of information do we get, when we found out, that Mojca got a book with blue covers from a pile of 40 books with different colors of covers? (2 points)
    20.2. How many bits of information do we get, when we found out, that Alenka got a book with blue covers from a pile of 40 books, where each five books covers are in the same color? (2 points)
21. There is an expression =A1*B1 in cell C1. The content of a cell C1 is copied in cell C2.



    21.1. Write an expression and result in cell C2. (4 points)
22. In data processing we use the terms entity and attribute.
    22.1. What is the difference between entity and attribute? (2 points)
    22.2. What is entity set? (2 points)
23. Real numbers can be written binary in different forms.
    23.1. Write the number $10010{,}01101_{(2)}$ in floating point arithmetic. (4 points)
24. In order to record the sound we measure the intensity of the acoustic signal several times per second. The frequency sampling determines how many times we perform this measurement.
    24.1. Write a typical value of frequency sampling for standard record (HI-FI) on a disc. (2 points)
    24.2. The quality of the recorded sound is also influenced by the relation between sound and noise, which is called _____ and measured in unit _____. (2 points)
25. On computer we normally record the sound in stereo and the data is written with four bytes.
    25.1. Calculate the size of the file, where 5-minute long recording of a song is stored. Let's assume that sound card is sampling sound with 96 kHz. (4 points)

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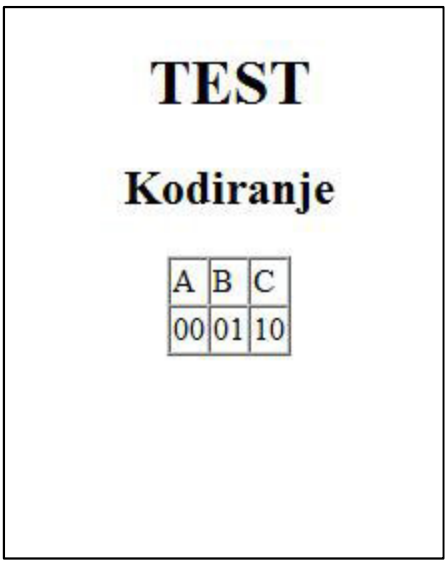
Examination Part 2

90 min

1. Rado wants to make a website with content below.



He made a description in HTML language:

```
<html>
  <head>
  <title>

  </title>
  </head>

  <body>
        <center>

        <h1> TEST </h>
        <h2> Kodiranje </h2>

        <table border="1" cellspacing="0">
            <tr>
                <td> A </td>
                <td> B </td>
                <td> C </td>
            </tr>

        </table>
        </center>

< html>
```

There are some mistakes in the description.

1.1. Find the mistakes in description. *(5 points)*

1.2. Fix the discovered mistakes. *(5 points)*

2. There is a picture, which size is 1000x1000 pixels.

2.1. What is the size of picture (in mm) on the screen with resolution 96 dpi? (3 points)

2.2. What is the size of picture (in mm), when we print it with resolution 300 dpi? (3 points)

2.3. How much space does the picture take on the disk, if it is saved in unconcentrated form with 16-bit color depth? (4 points)

Note: 1 inch is 25,4 mm.

3. In relational database there are records of people, presented with attributes: `ID, Surname_Name, Date_of_Birth, Married, Number_of_children`.
   Determine the data type of attributes and for each of them write an example of value.
   - 3.1. `ID` _____ (2 points)
   - 3.2. `Surname_Name` _____ (2 points)
   - 3.3. `Date_of_Birth` _____ (2 points)
   - 3.4. `Married` _____ (2 points)
   - 3.5. `Number_of_children` _____ (2 points)

4. In some encoding table, which is used in computer, the letter J is written with a code 0049.
   - 4.1. In which numerical system is this record, if we know that it is not in decimal? (2 points)
   - 4.2. Convert this number in decimal numerical system and write it. (write the procedure) (6 points)
   - 4.3. Write this number in binary system. (write the procedure) (6 points)
   - 4.4. In numerical system, which you recognized in question 4.1., write the codes for letters K, L and M. (2 points)
   - 4.5. In numerical system, which you recognized in question 4.1., write the codes for letters R and S. (4 points)

5. There is a table with the following data:

	A	B	C	D	E	F	G	H
1					1$ = 0,80 €			
2								
3	**Artikli**	**Količina**	**Enota**	**Cena v €**	**Znesek v €**	**Cena v $**	**Znesek v $**	
4	Banane	1,27	kg	1,33				
5	Jogurt, nav	3	kos	0,27				
6	Sladka sm	1	kos	1,12				
7	Sir ementa	0,25	kg	11,1				
8	Jajca 6	1	kos	0,85				
9	**Skupaj**							
10								
11								
12								

Articles; amount; unit; price in EURO; sum in EURO; price in Dollars; sum in Dollars

   - 5.1. Write the expression in cell E4, so that you can copy it also in cells from E5 to E8 and it would work correctly. (2 points)
   - 5.2. Write the expression in cell F4, so that you can copy it also in cells from F5 to F8 and it would work correctly. (4 points)
   - 5.3. In the cell E9 write the function for addition of sums in column E. (2 points)
     Can you copy the expression from cell E9 to cell G9? (2 points)
   - 5.4. What would be the expression in cell E4, if we want to copy it also to the cells from G4 to G8? (4 points)
   - 5.5. What would be the most suitable diagram, if we want to show the shares of products considering paid sums (comparison of the shares paid for each kind of articles). (2 points)
     Draw this diagram and fill in the data. (4 points)

6. Graphically we show the algorithm with the flowchart.
   - 6.1. Draw the flowchart for the following problem:
     Program is reading integers, until the input is zero or negative number. At the end, the program's output is the number of entered odd and even numbers (without zero or negative number). (10 points)
   - 6.2. Write the diagram from question 6.1. into the chosen programming language (Python). (10 points)