Informatics Engineering
Computer and Networks Security

Worksheet 3

Subject(s):

- Loops.
- Trace/Debug

Part 1

1. Trace the value of the variable of the codes presented on pages 10, 14, 20 in the theoretical slides. When necessary, enter relevant inputs to understand how the code works.
2. Trace the value of the variable of the code presented on page 25 in the theoretical slides and check the reason of being an infinite cycle. Suggest a correction.
3. Using the appropriate repetition structure, present the abecedary in upper or lower case, depending on the option entered by the user ('M' upper case, 'm' lower case).
4. Write a program that reads numeric values until **`0`** (zero) is entered. At the end, it should show the average of the values entered.
5. Write a program that reads a positive integer (make sure the user enters a number greater than 0) and print the odd numbers smaller than that number (up to 0) in descending order.

Part 2

1. Implement a program that asks the user two values and one character representing one of the four arithmetic operations (+, -, *, /). Present the result of applying the operation corresponding to the values. If the character is invalid, the sum must be made by default. At the end, you should ask the user if he wants to repeat it, allowing him to make new calculations. Example:
   `Do you wish to continue? (Enter s/n).`
2. Implement a program that reads the desired menu option (options: `1. Create`, `2. Update`, `3. Delete`, `4. Exit`). If one of the options 1, 2 and 3 is chosen, it must present a text with the chosen option. If the choice is out of the valid options, you must inform the user. Then, you must present the menu again to select new operation until option 4 is chosen.
3. Create a game, which asks player 1 a value between **`0`** and **`100`**. Then, you must allow player 2 to try to hit the value entered by player 1. At each iteration, while the value is not discovered, you must inform if the value entered by player 2 is lower or higher than the value entered by player 1. At the end (when the value is discovered) you must present the number of attempts that player 2 needed to hit.
4. Write a program that indicates if a number requested from the user is a prime number.
5. In the elections for the student association there are five candidates. The votes are entered with the numbers **`1`**, **`2`**, **`3`**, **`4`** and **`5`**, indicating respectively the candidate. The **`0`** (zero) indicates a blank vote and **`9`** a null vote. Write a program that reads votes until the entered value is **`-1`**. Ensure that the

codes entered belong to the permitted value range. At the end, the program must show the total votes and, the total and percentages of the votes per candidate, the null votes, and blank votes.

Part 3 (Optional)

1. After reformulating the salary calculation program, the company "XPTO, Lda." decided that it was necessary to improve the user interaction with the program and asked for some changes to the program functioning. Considering the opinion of the program users is presented below the suggestions that you should implement in the new version of the program:
   Suggestions from users:
   - It should be possible after a due date calculation to make another calculation without the program ending. You should only exit if the user chooses this option.
   - In the options to choose it should be possible to redo the question when the value entered by the user is incorrect.
   - It should be possible for the user to abort the expiration calculation on any question.

   Concepts:
   a) Position: E-Employee, C-Chief, A-Administrator
   b) Basic salary: E-40 EUR/day, C-60 EUR/day and A-80 EUR/day
      i. Bonus of 5% of salary if you work more than 20 days in that month.
      ii. Bonus of 2% of the salary if you work more than 17 days in that month.
      iii. No bonus if you work 17 days or less.
   c) Food allowance: 5 euros/day for employees and 7.5 euros/day for bosses and administrators.
   d) IRS retention:
      i. 10% if the month's salary is less than 1000 euros.
      ii. 20% if the month's salary is over or equal to 1000 euros and less than 2500 euros.
      iii. 30% if the month's maturity is over or equal to 2500 euros.
   e) Social Security:
      i. Administrators – 9% employee charge and 21% employer charge.
      ii. Others – 11% of the employee and 23.75% of the employer

   The user should be asked for the code of the employee as well as his/her position, and the number of days he/she worked that month. You must then present
   a. the gross amount (Base + Bonus) to receive as salary.
   b. total amount of food allowance.
   c. IRS withholding amount to hand over to the State.
   d. total amount to hand over to Social Security (both charges).
   e. Net amount to be received by the employee.
   f. Total charge with salaries, subsidies and taxes that the company will have.