COMSATS University Islamabad
Department of Computer Science
Programming Fundamentals (CSC103) – BSCS-2A & 2B
LAB Assignment – 1

Due Date: October 25, 2021 (11:59 pm)

Instructions

Total Marks: 10 x 5 = 50

Answer to all questions must be submitted in MS Word.

Answer to all questions should begin on new page.

Assignment document must contain a title page showing Assignment-1, your name and registration number.

Assignment document must also contain JAVA source code along with output.

Solution to each question must be created in separate .java file. For example, Question1.java

You must follow proper JAVA naming convention for identifiers and properly document your source code

Combine all your work in one folder. The folder must contain .JAVA source files (for JAVA Programming Questions) and a .doc/.docx file.

Name of the Assignment document file should be your Registration Number. E.g. FA21BCS01.docx

Submit your work via MS Teams

Plagiarism: Plagiarism is not allowed. If found plagiarized, zero marks will be awarded in the assignment.

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Question – 1:

Cindy uses the services of a brokerage firm to buy and sell stocks. The firm charges 1.5% service charges on the total amount for each transaction buy or sell. When Cindy sells stocks, she would like to know if she gained or lost on a particular investment. Write a program that allows Cindy to input the number of shares sold the purchase price of each share, and the selling price of each share. The program outputs the amount invested, the total service charges, amount gained or lost, and the amount received after selling the stock.

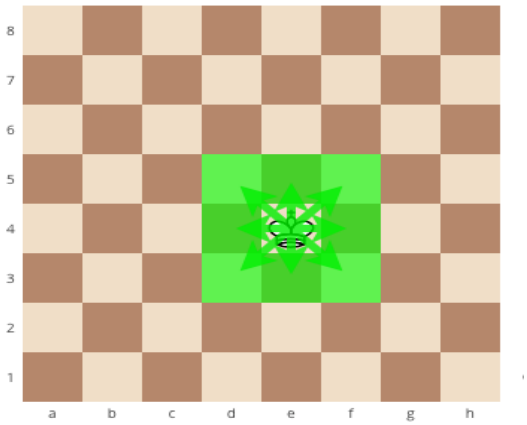
Question – 2: **CLO-3**

Write a program that computes the cost of painting and installing carpet in a room. Assume that the room has one door, two windows, and one book-shelf. Your program must do the following

- Prompts the user to enter, in feet, the length, width, and height of a room. Read the dimensions of the room.
- Prompts the user to enter the widths and heights, in feet, of the door, each window, and the bookshelf. Read these quantities.
- Prompts the user to enter the cost, per square foot, of painting the walls. Read these quantities.
- Prompts the user to enter of cost, per square foot, of installing carpet. Read these quantities.
- Outputs the cost of painting the walls and installing the carpet.

Question – 3:

In the Chess game, King moves horizontally, vertically or diagonally to any adjacent cell as shown in figure. Given two different cells of the chessboard, determine whether a king can go from the first cell to the second in one move.



Write a program that will receive the input of four numbers from 1 to 8, each specifying the column and row number, first two - for the first cell, and then the last two - for the second cell. The program should output YES if a king can go from the first cell to the second in one move or NO otherwise.

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Question – 4:

Write a program that prompts the user to enter an integer and determines whether it is divisible by 5 and 6, whether it is divisible by 5 or 6, and whether it is divisible by 5 or 6, but not both. Here is a sample run of this program:

```
Enter an integer: 10 Enter
Is 10 divisible by 5 and 6? false
Is 10 divisible by 5 or 6? true
Is 10 divisible by 5 or 6, but not both? true
```

Question – 5: **CLO-1**

Write a program that calculates and prints the monthly paycheck for an employee. The net pay is calculated after taking the following deductions:

Federal Income Tax: 15%
State Tax: 3.5%
Social Security Tax: 5.75%
Medicare/Medicaid Tax: 2.75%
Pension Plan: 5%
Health Insurance: $75.00

Your program should prompt the user to input the gross amount and the employee name. Format your output to have two decimal places. A sample output follows:

```
Bill Robinson
Gross Amount:          $ 3575.00
Federal Tax:           $  536.25
State Tax:             $  125.13
Social Security Tax:   $  205.56
Medicare/Medicaid Tax: $   98.31
Pension Plan:          $  178.75
Health Insurance:      $   75.00
Net Pay:               $ 2356.00
```

Question – 6:

Mr. Ahmad would like to withdraw X $US from an ATM. The cash machine will only accept the transaction if X is a multiple of 5, and Ahmad's account balance has enough cash to perform the withdrawal transaction (including bank charges). For each successful withdrawal the bank charges 0.50 $US. Calculate Ahmad's account balance after an attempted transaction.

Input

Positive integer 0 < X <= 2000 - the amount of cash which Ahmad wishes to withdraw. Nonnegative number 0<= Y <= 2000 with two digits of precision - Ahmad's initial account balance.

Example - Successful Transaction **Input:** 30 120.00 **Output:** 89.50
Example - Incorrect Withdrawal Amount (not multiple of 5) **Input:** 42 120.00 **Output:** 120.00
Example - Insufficient Funds **Input:** 300 120.00 **Output:** 120.00

Question-7

School students like to play a game in which they have blocks each denoting some integer from 0 to 9. These are arranged together in a random manner without seeing to form different numbers keeping in mind that the first block is never a 0. Once they form a number they read in the reverse order to check if the number and its reverse is the same. If both are same then the player wins.

Now they want to simulate the same in computer. For simulating, the first step is to take input (a number) from the user and check if the number and its reverse number are same or not. If the number and its reverse number are same then user wins otherwise user loses the game.

Input: An integer N (3 digit number Only) **Output:** Win/Lose **Example Win** **Input:** 323 **Output:** Win **Example Lose** **Input:** 445 **Output:** Loses

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Question-8

A shipping company uses the following function to calculate the cost (in dollars) of shipping based on the weight of the package (in pounds).

$$c(w) = \begin{cases} 3.5, \text{if } 0 < w <= 1 \\ 5.5, \text{if } 1 < w <= 3 \\ 8.5, \text{if } 3 < w <= 10 \\ 10.5, \text{if } 10 < w <= 20 \end{cases}$$

Write a program that prompts the user to enter the weight of the package and display the shipping cost. If the weight is greater than 50, display a message "the package cannot be shipped."

Question-9

Zeller's congruence is an algorithm developed by Christian Zeller to calculate the day of the week. The formula is

$$h = \left(q + \frac{26(m+1)}{10} + k + \frac{k}{4} + \frac{j}{4} + 5j \right) \% 7$$

Where

- **h** is the day of the week (0: Saturday, 1: Sunday, 2: Monday, 3: Tuesday, 4: Wednesday, 5: Thursday, 6: Friday).
- **q** is the day of the month.
- **m** is the month (3: March, 4: April, …, 12: December). January and February are counted as months 13 and 14 of the previous year.
- **j** is the century (i.e., year / 100).
- **k** is the year of the century (i.e., year % 100).

Note that the division in the formula performs an integer division. Write a program that prompts the user to enter a year, month, and day of the month, and displays the name of the day of the week. Here are some sample runs:

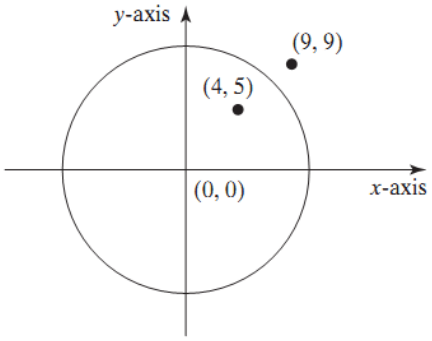
```
Enter year: (e.g., 2012): 2015 Enter
Enter month: 1-12:  1 Enter
Enter the day of the month: 1-31: 25 Enter
Day of the week is Sunday
```

```
Enter year: (e.g., 2012): 2012 Enter
Enter month: 1-12: 5 Enter
Enter the day of the month: 1-31: 12 Enter
Day of the week is Saturday
```

(Hint: January and February are counted as 13 and 14 in the formula, so you need to convert the user input 1 to 13 and 2 to 14 for the month and change the year to the previous year.)

Question-10

Write a program that prompts the user to enter a point (x, y) and checks whether the point is within the circle centered at (0, 0) with radius 10. For example, (4, 5) is inside the circle and (9, 9) is outside the circle, as shown in Figure



Two sample runs are shown below

```
Enter a point with two coordinates: 4 5 Enter
Point (4.0, 5.0) is in the circle
```

```
Enter a point with two coordinates: 9 9 Enter
Point (9.0, 9.0) is not in the circle
```