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Time taken	1 hour 19 mins

Question 1

Correct

Marked out of 30.00

1. Computation [30%]

The formula f has two inputs: n (date type: **int**) and x (date type: **double**). The result of f is also **double** type

$$f = x^1 + x^2 + x^3 + \cdots + x^n$$

Write a program according to the following requirements:

- For the inputs of n and x , we assume that they are already the **int-type** and **double-type** number respectively, i.e., you do not need to check whether they are belonged to any other data types.
- For the input x , check whether $0.1 \leq x \leq 1$. If no, input x again.
- Next, for the input n , check whether it is **positive** and **odd**. If no, input n again.
- If both n and x are valid, compute and output the value of f , with only **two digits** in the decimal pa all the time.

Note: Your code should **NOT** use the function **pow(x,i)**.

For example:

Input	Result
0.3 5	Input x: Input n: Value is: 0.43
0.1 7	Input x: Input n: Value is: 0.11
0 1.2 0.95 -1 4 5	Input x: Input x: Input x: Input n: Input n: Input n: Value is: 4.30

Answer: (penalty regime: 0 %)

Reset answer

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```

#include <iostream>
#include <iomanip>
using namespace std;

double pwr(double x, int n) {
    double res = 1;
    for (int i=0; i<n; i++) {
        res *= x;
    }
    return res;
}

void Q1() {
    double x;
    int n;

    do {
        cout << "Input x:" << endl;
        cin >> x;
    } while (x < 0.1 || x > 1);

    do {
        cout << "Input n:" << endl;
        cin >> n;
    } while (n<0 || n % 2 == 0);

    double f = 0;

    for (int i=1; i<=n; i++) {
        f += pwr(x, i);
    }

    cout << endl;
    cout << "Value is: " << fixed << setprecision(2) << f << endl;
}

int main() {

```

	Input	Expected	Got	
✓	0.3 5	Input x: Input n: Value is: 0.43	Input x: Input n: Value is: 0.43	✓
✓	0.1 7	Input x: Input n: Value is: 0.11	Input x: Input n: Value is: 0.11	✓
✓	0 1.2 0.95 -1 4 5	Input x: Input x: Input x: Input n: Input n: Input n: Value is: 4.30	Input x: Input x: Input x: Input n: Input n: Input n: Value is: 4.30	✓

Passed all tests! ✓

Question 2

Correct

Marked out of 35.00

2. Calculation [35%]

Write a program according to the requirements:

- Read 10 integers as the inputs and store them in an array first (**int arr[10]**). We assume that the input positive integer (data type: **int**) is valid. No need to check its correctness.
- We assume that the int type is large enough for the input, but we do not assume that your program knows the number of digits that each input number contains before the user's input.
- Calculate the sum of digits for each input number, and store the results in an output array (**int out[10]**). For example, for an input number 361, its sum of digits is 3+6+1=10, and 10 will be stored in the output array for input 361.
- Implement the Bubble sorting algorithm by yourself to sort all the input numbers in the array **arr[]** in an **increasing order**. During sorting, if two numbers in **arr[]** are swapped, their corresponding values in **out[]** should be swapped as well. In other words, after sorting, each **out[i]** still indicates the sum of digits for **arr[i]**.
- Display the sorted input numbers together with their corresponding results.

For example:

Input	Result
12 23 34 23 56 34 89 10 361 204	Enter all the numbers (arr): Sum of digits for each input number (out): 3 5 7 5 11 7 17 1 10 6 Sorted arrays: 10 12 23 23 34 34 56 89 204 361 1 3 5 5 7 7 11 17 6 10
32 47 10 2 83 59 94 195 204 7612	Enter all the numbers (arr): Sum of digits for each input number (out): 5 11 1 2 11 14 13 15 6 16 Sorted arrays: 2 10 32 47 59 83 94 195 204 7612 2 1 5 11 14 11 13 15 6 16

Answer: (penalty regime: 0 %)

Reset answer

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```

#include <iostream>
#include <iomanip>
using namespace std;

int tenPwr(int n) {
    int res = 1;

    for (int i=0; i<n; i++) {
        res *= 10;
    }
    return res;
    cout << "power: " << res << endl;
}

int sumofDigits(int digit) {
    int len = 0;
    int temp = digit;
    do {
        temp /= 10;
        len++;
    } while (temp > 10);
    len++; // karena ada 1 lagi

    int sum = 0;
    for (int i=len; i>0; i--) {
        int a = digit / tenPwr(i-1);
        sum += a;
        digit %= tenPwr(i-1);
    }

    return sum;
}

void sort(int list[]) {
    for (int i=0; i<10-1; i++) {
        for (int j=10-1; j>i; j--) {
            if (list[j] < list[j-1]) {
                int temp = list[j];
                list[j] = list[j-1];
            }
        }
    }
}

```

	Input	Expected	Got	
✓	12 23 34 23 56 34 89 10 361 204	Enter all the numbers (arr): Sum of digits for each input number (out): 3 5 7 5 11 7 17 1 10 6 Sorted arrays: 10 12 23 23 34 34 56 89 204 361 1 3 5 5 7 7 11 17 6 10	Enter all the numbers (arr): Sum of digits for each input number (out): 3 5 7 5 11 7 17 1 10 6 Sorted arrays: 10 12 23 23 34 34 56 89 204 361 1 3 5 5 7 7 11 17 6 10	✓
✓	32 47 10 2 83 59 94 195 204 7612	Enter all the numbers (arr): Sum of digits for each input number (out): 5 11 1 2 11 14 13 15 6 16 Sorted arrays: 2 10 32 47 59 83 94 195 204 7612 2 1 5 11 14 11 13 15 6 16	Enter all the numbers (arr): Sum of digits for each input number (out): 5 11 1 2 11 14 13 15 6 16 Sorted arrays: 2 10 32 47 59 83 94 195 204 7612 2 1 5 11 14 11 13 15 6 16	✓

Passed all tests! ✓

Question 3

Correct

Marked out of 35.00

3. Program Comprehension and Development [35%]

Assume there are 10 books and their IDs are represented by the characters from 'A' to 'J'. Please Implement class called Book, which contains five **private** member variables:

- **id**: a single **char** variable, storing the book ID
- **subject**: a **string object**, storing the subject this book belongs to, e.g., "Computer Science"
- **price**: an **int** variable, storing the price of the book
- **month**: an **int** variable, storing the month for the **returning date** of the book
- **day**: an **int** variable, storing the day for the **returning date** of the book

The class Book also has the following **public member functions**:

- **getID()**: returns the book's ID
- **getSub()**: returns the book's subject
- **getPrice()**, returns the book's price
- **getMonth()**, returns the book's returning month
- **getDay()**, returns the book's returning day
- **set(char i, string s, int p, int m, int d)**, sets each member variable

Part-a): Complete the class definition of Book (do **NOT** change any identifiers given above and do **NOT** add an extra members).

- All the **member variables** are **private**, and all the **member functions** are **public**
- Declare all the **member variables**
- Implement **getID()**, **getSub()**, **getPrice()**, **getMonth()** and **getDay()** inside the class directly
- Write the prototype of **set(...)** inside the class. Implement it outside the class.

Part-b): In Q3(), we provide the information for ten books, including their IDs, subjects, prices and returnin dates. Please declare an array to store 10 Book objects, and use the information provided above to initialize eac Book object. Then print the information of each book as shown in the expected output.

Next, implement a **non-member** function, **sortBooks(Book bArr[])**. It sorts an array of Book objects, according t their prices in an **ascending (increasing)** order. If two books have the same price, further sort them according t their subjects in an **descending (decreasing)** order.

Note: you can use the **compare()** function defined in the **<string>** library to compare the **subjects (string object)** of two books for sorting.

For example:

Result

The list of the books:
Book A: Math 2-20
Book B: Computer Science 3-16
Book C: Biology 2-23
Book D: Computer Science 10-5
Book E: Physics 11-2
Book F: Psychology 1-1
Book G: Business 5-30
Book H: Physics 6-24
Book I: Chemistry 8-17
Book J: Biology 5-8

The list of sorted books:
B(60, Computer Science)
A(80, Math)
D(80, Computer Science)
J(80, Biology)
C(150, Biology)
I(160, Chemistry)
E(200, Physics)
H(240, Physics)
G(240, Business)
F(300, Psychology)

Answer: (penalty regime: 0 %)

Reset answer

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```
#include <iostream>
#include <iomanip>
#include <string>
using namespace std;

class Book {
private:
    char id;
    string subject;
    int price;
    int month;
    int day;
public:
    char getID() {
        return id;
    }
    string getSub() {
        return subject;
    }
    int getPrice() {
        return price;
    }
    int getMonth() {
        return month;
    }
    int getDay() {
        return day;
    }

    void set(char, string, int, int, int);
};

void Book::set(char i, string s, int p, int m, int d) {
    id = i;
    subject = s;
    price = p;
    month = m;
    day = d;
}
```

	Expected	Got	
✓	<p>The list of the books:</p> <p>Book A: Math 2-20</p> <p>Book B: Computer Science 3-16</p> <p>Book C: Biology 2-23</p> <p>Book D: Computer Science 10-5</p> <p>Book E: Physics 11-2</p> <p>Book F: Psychology 1-1</p> <p>Book G: Business 5-30</p> <p>Book H: Physics 6-24</p> <p>Book I: Chemistry 8-17</p> <p>Book J: Biology 5-8</p> <p>The list of sorted books:</p> <p>B(60, Computer Science)</p> <p>A(80, Math)</p> <p>D(80, Computer Science)</p> <p>J(80, Biology)</p> <p>C(150, Biology)</p> <p>I(160, Chemistry)</p> <p>E(200, Physics)</p> <p>H(240, Physics)</p> <p>G(240, Business)</p> <p>F(300, Psychology)</p>	<p>The list of the books:</p> <p>Book A: Math 2-20</p> <p>Book B: Computer Science 3-16</p> <p>Book C: Biology 2-23</p> <p>Book D: Computer Science 10-5</p> <p>Book E: Physics 11-2</p> <p>Book F: Psychology 1-1</p> <p>Book G: Business 5-30</p> <p>Book H: Physics 6-24</p> <p>Book I: Chemistry 8-17</p> <p>Book J: Biology 5-8</p> <p>The list of sorted books:</p> <p>B(60, Computer Science)</p> <p>A(80, Math)</p> <p>D(80, Computer Science)</p> <p>J(80, Biology)</p> <p>C(150, Biology)</p> <p>I(160, Chemistry)</p> <p>E(200, Physics)</p> <p>H(240, Physics)</p> <p>G(240, Business)</p> <p>F(300, Psychology)</p>	✓

Passed all tests! ✓