

CS101: Computer Programming and Utilization, Spring 2020

Lab4 (L2), Wednesday 5th February 2020

Instructions and Program Submissions: You will have to submit all the programs on cs101.bodhi.cse.iitb.ac.in.

Deadline : **Wednesday, 5th February 2020, 10:30 PM**

Q1. You are given **n** numbers as input. Write a program to find the maximum sum of all pairs of consecutive numbers in the sequence. Use repeat loop to take the inputs. You might use the following functions,

```
max(a,b) = a if a>=b
          = b if b>a
min(a,b) = a if a<=b
          = b if b<a
abs(a)   = a if a>=0
          = -a if a<0
```

Examples,

```
int a=5, b=4;
cout<<max(a,b);
```

Output->5

```
int a=6,b=6;
cout<<max(a,b);
```

Output->6

```
int a=5,b=4;
cout<<min(a,b);
```

Output->4

```
int a=6,b=6;
cout<<min(a,b);
```

Output->6

```
cout<<abs(-9)<<" "<<abs(9);
```

Output->9 9

Input format:

First line contains **n** ($2 \leq n \leq 100$), the number of inputs. Following **n** lines contain **ai**'s, that is the entered number, $1 \leq ai \leq 10^{17}$

Output format:

Single line containing the maximum sum among the pairs of consecutive numbers.

Filename for code: **maxsum.cpp**

Sample input:

```
6 //n
1 //a1
5 //a2
6 //a3
2 //a4
2 //a5
6 //a6
```

Sample output:

```
11
```

Explanation: Sum of the consecutive numbers, a2 and a3 is the largest, equal to 11.

Sample input:

```
2 //n
1 //a1
1 //a2
```

Sample output:

```
2
```

Q2. Take an integer n as input. You have to calculate the value of $4*(1 - 1/3 + 1/5 - \dots((-1)^n)*1/(2n+1))$ and output it. You can print your answer using the command `(cout<<answer<<endl;)`. This infinite series gives us the **value of pi as $n \rightarrow \infty$** .

Note: Use **double** to store your answer.

Note: You can convert an int into a double/float by **multiplying the integer with 1.0**. So, for example, if we have `int a=4,b=5;` then `double x = a/b;` gives `x=0`. But, `double x = a*1.0/b;` gives `x=0.8`.

Filename for code: pi.cpp

Sample input:

```
0
```

Sample output:

```
4
```

Explanation: $n=0$ here, so $2n+1=1$. Hence $\text{answer}=(4*1)$

Sample input:

```
1
```

Sample output:

2.66667

Explanation: $n=1$ here, so $2n+1=3$. Hence $\text{answer}=4*(1 - \frac{1}{3})$

Q3. Given a number n , print its position in the fibonacci sequence if it is a fibonacci number. The definition of fibonacci number $\text{fib}(n)$ is given as follows:

$\text{fib}(0)=0$, $\text{fib}(1)=1$

$\text{fib}(n)=\text{fib}(n-1)+\text{fib}(n-2)$ for $n \geq 2$

Input format: Input a single number n ($0 \leq n \leq 10^{16}$).

Output format: Output a single number x if there exists some $x(\geq 0)$ such that $\text{fib}(x)=n$, else print -1.

File name: **fib.cpp**

Sample input_1:

55

Sample output_1:

10

Sample input_2:

4

Sample output_2:

-1

Sample input_3:

1

Sample output_3:

1

*Careful that $\text{fib}(1)$ and $\text{fib}(2)$ are both equal to 1, so in this particular case (sample input_3), 1 would be considered as the correct output.

Q4. Write a program for a basic calculator which performs 4 arithmetic operations (+, -, *, /).

Hint: Try solving the problem with **switch case** construct.

Filename : **calci.cpp**

Input Format:

- First read an integer **Q**, the number of operations to perform.

- Each of the subsequent lines contains three space separated characters : **Num1**, **operator**, **Num2**. Declare Num1 and Num2 to be of type **float**.
- **Operator** can be any character.

Output Format:

- Print the result of the operation with a newline if the operator is valid, for the invalid case (If it's not from the set {+, -, /, *}), **Output -1**.

Sample Input:

```
5
2 + 2
2 * 2
2 - 2
2 / 2
2 & 2
```

Sample Output:

```
4
4
0
1
-1
```