

LOOPS

Problem Solving with Computers-I

<https://ucsb-cs16-wi17.github.io/>

C++

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

int main(){
    cout<<"Hola Facebook\n";
    return 0;
}
```



Announcements

- Homeworks should be submitted in the provided template
- HW 3 and 4 released, due next week in class

Clickers out – frequency AB

Control Flow: for loops

```
for ( int i = 0; i < 15; i++ ) {  
    cout << i << endl ;  
}
```

What is the output of the above code?

Write a program that generates the following output:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Previous code:

```
for (int i = 0; i < 15; i++) {  
    cout << i << endl ;  
}
```

Modify the program from the previous example to print a sequence: x_{\min} , $x_{\min}+1$, $x_{\min}+2$, ..., x_{\max} for user specified inputs x_{\min} and x_{\max}

Sample run of the program:

```
$ ./test
```

```
Enter the limits of the sequence
```

```
10 15
```

```
10, 11, 12, 13, 14, 15
```

Write a program that calculates the sum of the series:
1, 2, 3, ..., n,
where `n` is specified by the user

Sample run of the program:

```
Enter the number of terms in the sequence
```

```
4
```

```
Sum of the first 4 terms is: 10
```

Fizzbuzz – 3.0

1

2

fizz

4

buzz

fizz

7

8

fizz

buzz

fizzbuzz

Let's code Fizzbuzz 3.0!

Control Flow: while loops

```
while (Boolean expression) {  
    //statement 1  
    //statement 2  
  
}
```

Repeat the previous exercises with while loops

Use while loops to print a sequence: x_{\min} , $x_{\min}+1$, $x_{\min}+2$, ..., x_{\max}
for user specified inputs x_{\min} and x_{\max}

Sample run of the program: (You must use while loops)

```
$ ./test_while
```

```
Enter the limits of the sequence
```

```
10 15
```

```
10, 11, 12, 13, 14, 15
```

Write a program that calculates the series:
 $1 + 1/2 + 1/3 + \dots + 1/n$,
where `n` is specified by the user

Sample run of the program:

```
Enter the number of terms in the sequence
```

```
2
```

```
Sum of the first 2 terms is : 1.500
```

C++ types in expressions

```
int i =10;
```

```
double sum = 1/i;
```

What is printed by the above code?

- A. 0
- B. 0.1
- C. 1
- D. None of the above

Setting up output when printing doubles

```
int i =10;  
double sum = 1/static_cast<double>(i);  
cout.setf(ios::fixed);      // Using a fixed point representation  
cout.setf(ios::showpoint); //Show the decimal point  
cout.precision(3);  
cout<<sum;
```

What is printed by the above code?

- A. 0
- B. 0.1
- C. 0.10
- D. 0.100
- E. None of the above

for loop OR while loop? Which one should you use?

```
for (int i = 0; i < 15; i++) {  
    cout << i << endl ;  
}
```

```
int j =0;  
while(j < 15) {  
    cout << j << endl ;  
    j++;  
}
```

Nesting control structure

```
for (int i = 0; i < 15; i++) {  
    if (i%3 == 0)  
        cout<<"fizz"<<endl;  
    else  
        cout << i << endl ;  
}
```

Can we write nested for loops?

Nested for loops – ASCII art!

Write a program that draws a square of a given width

```
./drawSquare
```

```
Enter the width of the square
```

```
5
```

```
*****
```

```
*****
```

```
*****
```

```
*****
```

```
*****
```

Draw a triangle

Which line of the drawSquare code
(show on the right) would you modify
to draw a right angled triangle

```
./drawTriangle
Enter the length of the base
5

*
**
***
****
```

```
5 int main(){
6     int side;
7     cout<<"Enter the length of the base"<<endl;
8     cin>>side;
9
10    for(int j = 0; j < side; j++){ //A
11        for(int i=0; i < side; i++){ //B
12            cout<<"*"; //C
13        }
14        cout<<endl; //D
15    }
16    cout<<endl; //E
17
18 }
```


Identify the code that is not equivalent to the other two?
Assume 'n' is an integer that has already been declared (may be positive or negative)

A.

```
for( int x = 0; x < n; x++ ) {  
    cout<<x <<endl;  
}
```

B.

```
int x = 0;  
while(x < n) {  
    cout<< x << endl;  
    x++;  
}
```

C.

```
int x = 0;  
do{  
    cout<< x<< endl;  
    x++;  
} while(x < n);
```

D. They are ALL equivalent

Infinite loops

```
for (int y=0; y<10; y--)  
    cout<<"Print forever\n";
```

```
int y=0;  
for (; y++)  
    cout<<"Print forever\n";
```

```
int y=0;  
for (; y<10; ) ;  
    y++;
```

```
int y=0;  
while (y<10)  
    cout<<"Print forever\n";
```

```
int y=0;  
while (y=2)  
    y++;
```

Next time

- C++ functions and function call mechanics
- Passing parameters to programs