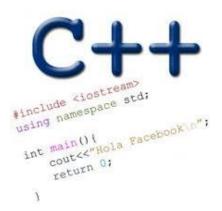# LOOPS

Problem Solving with Computers-I

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

# 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
```

# 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

# Write a program that calculates the series: 1+ 1/2+ 1/3+ ….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
```

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

```cpp
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