

# FUNCTIONS, MORE LOOPS

Problem Solving with Computers-I

<https://ucsb-cs16-sp17.github.io/>

C++

```
#include <iostream>
using namespace std;
int main() {
    cout << "Hola Facebook!";
    return 0;
}
```

GitHub

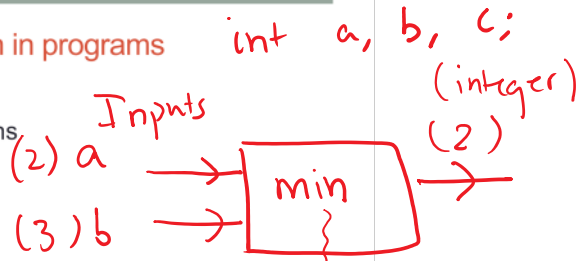


Clickers out – frequency AB

Functions: Basic abstraction in programs

- Functions keep you DRY!
- Three steps when using functions.

1. DECLARE
2. DEFINE
3. CALL



```
int min (int a, int b);
```

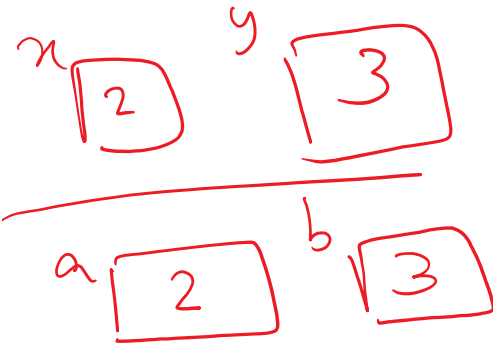
Annotations: 'return datatype' points to 'int', 'name of function' points to 'min'.

```
int min (int a, int b) {
    if (a < b) {
        return a;
    }
    else {
        return b;
    }
}
```

```
int main () {
    int x, y;
    cin >> x >> y;
    int result = min (x, y);
    cout << result;
}
```

Annotation: '2' points to the value of 'result'.

```
void printMin (int a, int b) {
    if (a < b)
        cout << a;
    else
        cout << b;
    return;
}
```



## ASCII art! Nested loops and functions

Write a FUNCTION that draws a square of a given width, and use it in a program with the following runtime behavior:

```
./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

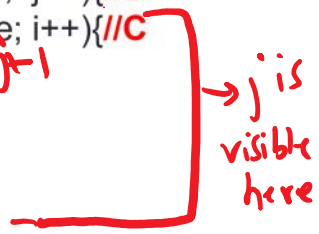
```
./drawTriangle
Enter the length of the base
5
```

```
→ *
- **
- ***
- ****
- *****
```

*drawTriangle*

```
5 void drawSquare(int side){//A
6
7 for(int j = 0; j < side; j++){//B
8   for(int i=0; i < side; i++){//C
9     cout<<"*";
10  }
11  cout<<endl;
12 }
13 cout<<endl;
14
15 }
```

//D: A and B  
//E: A and C



## Passing parameters to programs

```
int main(int argc , char *argv[]){  
...  
}
```

*Handwritten annotations:*  
- Under `argc`: `2`  
- Under `argv`: `argv[0]`  
- Under `argv[1]`: `"5"`  
- Above `argv[1]`: `"/drawTriangle"`

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

```
./drawTriangle 5  
  
*  
**  
***  
****
```

## What is the value of argc in each of these cases?

```
int main(int argc , char *argv[]){
```

```
...
```

```
}
```

```
./drawTriangle
```

```
./drawTriangle 5
```

```
./drawTriangle 5 cat dog fizz
```

## Evaluating C++ expressions with mixed types

```
int i = 10;  
double sum = 1/i;
```

*double sum = 1.0 / i ;*

What is printed by the above code?

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

*1 / double(i) ;*

## 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 FUNCTION that calculates the series:  
 $1 + 1/2 + 1/3 + \dots + 1/n$ , where `n` is a parameter passed to the program

Sample run of the program:

```
./sumseries 2  
Sum of the first 2 terms is : 1.500
```

```
./sumseries 3  
Sum of the first 3 terms is : 1.833
```

$$(-1)^n / (2n+1)$$

^

\* \*

pow(-1, n)

## Control Flow: while and do while loops

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

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

```
char ans = 'y';
while (ans == 'y') {
    cout << "Do you want to continue";
    cin >> ans;
}
```