THE BIG FOUR

Problem Solving with Computers-II

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

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

Read the syllabus. Know what’s required. Know how to get help.

The Big Four

1. Constructor
2. Destructor
3. Copy Constructor
4. Copy Assignment

Constructor and Destructor

Every class has the following special methods:

- Constructor: Called right AFTER new objects are created in memory

- Destructor: Called right BEFORE an object is deleted from memory

The compiler automatically generates default versions, but you can override them

Constructor (last class)

```
void foo(){
    Complex p;
    Complex* q = new Complex;
    Complex w{10, 5, 1};
}
```

How many times is the constructor called in the above code?

A. Never

B. Once

C. Two times

D. Three times

Initializer lists

* Used to initialize member variables at the time they are created
* Must be used to initialize constant member variables

Destructor

- Must have the same name as the class preceded by a ~ (tilda)
- Does not have a return type
- Called right BEFORE an object is deleted from memory

Destructor

```
void foo(){
     Complex p;
     Complex *q = new Complex;
}
```

The destructor of which of the objects is called after foo() returns?

A. p

B. q

C. *q

D. None of the above

Copy constructor

- Creates a new object and initializes it using an existing object

Copy constructor

- In which of the following cases is the copy constructor called?

```
A.  Complex p1; Complex p2{1, 2, 3};
B.  Complex p1{1, 2, 3}; Complex p2{p1};
C.  Complex *p1 = new Complex{1, 2, 3};
    Complex p2 = *p1;
D.  B&C
E.  A, B & C
```

Copy assignment

- Default behavior: Copies the member variables of one object into another

```
Complex p1{1, 2, 3}; // Parametrized constructor
Complex p2;
p2 = p1; // Copy assignment function is called
```

```
double foo(Complex p){
   return p.evaluate(10);
}
int main(){
    Complex q{1, 2, 3};
    foo(q);
    }
```

Which of the following special methods is called as a result of calling foo?

A. Parameterized constructor

B. Copy constructor

C. Copy Assignment

D. Destructor

Operator Overloading

We would like to be able to compare two objects of the class using the following operators

==

!=

and possibly others

```
bool operator==(const Complex & c1, const Complex &c2){
    return c1.real==c2.real && c1.imag == c2.imag;

}
```

Summary

- Classes have member variables and member functions (method). An object is a variable where the data type is a class.
- You should know how to declare a new class type, how to implement its member functions, how to use the class type.
- Frequently, the member functions of an class type place information in the member variables, or use information that's already in the member variables.
- New functionality may be added using non-member functions, friend functions, and operator overloading (next lectures)

Next time

- Linked Lists and the rule of three