THE BIG FOUR

Problem Solving with Computers-II

CLICKERS OUT

How did h01 (specifically the CS16 final) go?

A. I think I did well

B. Found it a bit difficult

C. Found some concepts unfamiliar

D. Extremely difficult

E. Didn’t attempt

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 c;
    Complex* c2 = new Complex;
    Complex c3(10, 5);
}
```

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

A. Never
B. Once
C. Twice
D. Thrice

Initialization 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 ~ (tilde)
- Does not have a return type
- Called right BEFORE an object is deleted from memory

Destructor

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

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. Quadratic p1; Quadratic p2(1, 2, 3);
B. Quadratic p1(1, 2, 3); Quadratic p2(p1);
C. Quadratic *p1 = new Quadratic(1, 2, 3);
   Quadratic p2 = *p1;
D. B&C
E. A, B & C
```

Copy assignment

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

```
Quadratic p1(1, 2, 3); // Parametrized constructor
Quadratic p2;
p2 = p1; // Copy assignment function is called
```

```
double foo(Quadratic p){
    return p.evaluate(10);
}
int main(){
     Quadratic 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

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 a 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 operator overloading