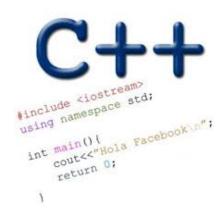
THE BIG FOUR

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