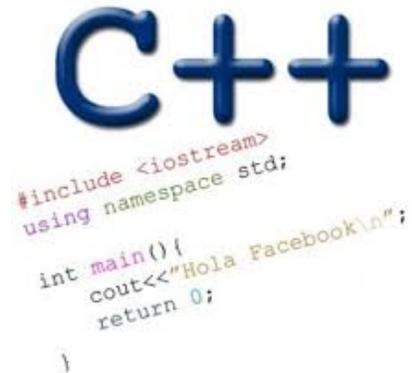# THE BIG FOUR

Problem Solving with Computers-II

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

CLICKERS OUT

How is h01 (specifically the CS16 final) going?

A. Done - I think I have done well

B. Attempted - found it a bit difficult

C. Attempted - found some concepts alien

D. Attempted - extremely difficult

E. Haven't attempted

Clickers out – frequency AC

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

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 ~ (tilda)
- 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 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 operator overloading