LEC 11

CSE 122

Constructors, More Instance Methods

Questions during Class?

Raise hand or send here

sli.do #cse122

BEFORE WE START

Talk to your neighbors:

Share a boring fact about yourself!

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Lecture Outline

- Announcements
- Warm up
- Review: Encapsulation, Constructors, toString()
- Larger Example
  - Code Quality

Announcements

- P2: Absurdle due yesterday
- Resub 4 form + C2 released today

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Practice : Think

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What is the correct implementation of the `distanceFrom` instance method?

(A)
```
public double distanceFrom() {
    double xTerm = Math.pow(x - x, 2);
    double yTerm = Math.pow(y - y, 2);
    return Math.sqrt(xTerm + yTerm);
}
```

(B)
$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

```
public static double distanceFrom(Point otherPoint) {
    double xTerm = Math.pow(otherPoint.x - x, 2);
    double yTerm = Math.pow(otherPoint.y - y, 2);
    return Math.sqrt(xTerm + yTerm);
}
```

(C)
```
public double distanceFrom(Point otherPoint) {
    double xTerm = Math.pow(otherPoint.x - x, 2);
    double yTerm = Math.pow(otherPoint.y - y, 2);
    return Math.sqrt(xTerm + yTerm);
}
```

(D)
```
public double distanceFrom(int otherX, int otherY) {
    double xTerm = Math.pow(otherX - x, 2);
    double yTerm = Math.pow(otherY - y, 2);
    return Math.sqrt(xTerm + yTerm);
}
```

Practice : Pair

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```

Practice : Think

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What do p and p2 hold after the following code is executed?

```
Point p = new Point();
p.setX(3);
p.setY(10);
Point p2 = p;
p2.setY(100);
p = new Point();
p.setY(-99);
```

A. p: (3, 10) p2: (3, 10)

B. p: (3, -99) p2: (3, 100)

C. p: (0, -99) p2: (3, 100)

D. p: (3, -99) p2: (0, 100)

E. p: (0, -99) p2: (3, 10)

Practice : Pair

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D. p: (3, -99) p2: (0, 100)

E. p: (0, -99) p2: (3, 10)

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p.setY(-99);
```

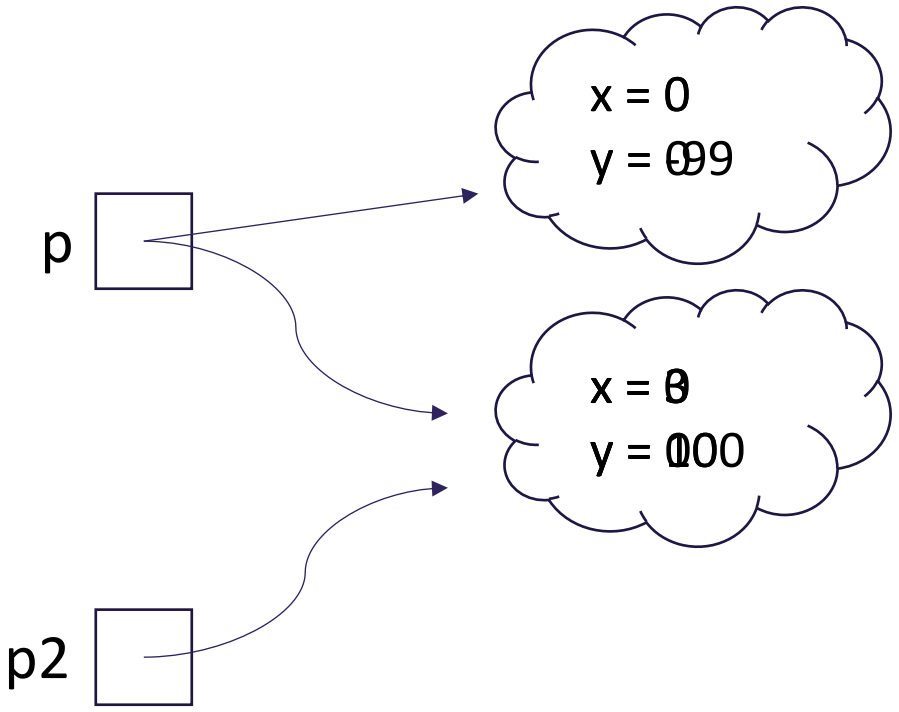

p: (0, -99) p2: (3, 100)

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(PCM) Encapsulation

Objects *encapsulate* state and expose behavior.

Encapsulation is hiding implementation details of an object from its clients.

Encapsulation provides *abstraction*.

(PCM) private

The `private` keyword is an *access modifier* (like `public`)

Fields declared `private` cannot be accessed by any code outside of the object.

We **always** want to encapsulate our objects' fields by declaring them `private`.

Accessors and Mutators

Declaring fields as private removes all access from the user.

If we want to give some back, we can define instance methods.

Accessors ("getters")	Mutators ("setters")
`getX()`	`setX(int newX)`
`getY()`	`setY(int newY)`
	`setLocation(int newX, int newY)`

(PCM) Encapsulation

Objects *encapsulate* state and expose behavior.

Encapsulation is hiding implementation details of an object from its clients.

Encapsulation provides *abstraction*.

Encapsulation also gives the implementor flexibility!

Encapsulation

While users can still access and modify our Point's fields with the instance methods we defined, *we have control of how they do so*.

Can only accept positive coordinate values

Can swap out our underlying implementation to use polar coordinates instead!

Constructors

Constructors are called when we first create a new instance of a class.

```
Point p = new Point();
```

If we don't write any constructors, Java provides one that takes no parameters and just sets each field to its default value.

Constructor Syntax

```
public Point(int initialX, int initialY) {
    x = initialX;
    y = initialY;
}
```

If we write *any* constructors, Java no longer provides one for us.

this keyword

The `this` keyword refers to the current object in a method or constructor.

You can use it to refer to an object's fields

```
this.x, this.y
```

You can use it to refer to an object's instance methods

```
this.setX(newX)
```

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You can use it to refer to an object's instance methods

```
this.setX(newX)
```

You can use it to call one constructor from another

```
this(0, 0)
```

(PCM) toString

```
public String toString() {
    return "String representation of object";
}
```

The `toString()` method is automatically called whenever an object is treated like a `String`!

Why not write a `print()` method that prints out the String representation to the console?

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