

Lecture 7

Thursday Sept. 28

Point P 3

↘ default value: null

}

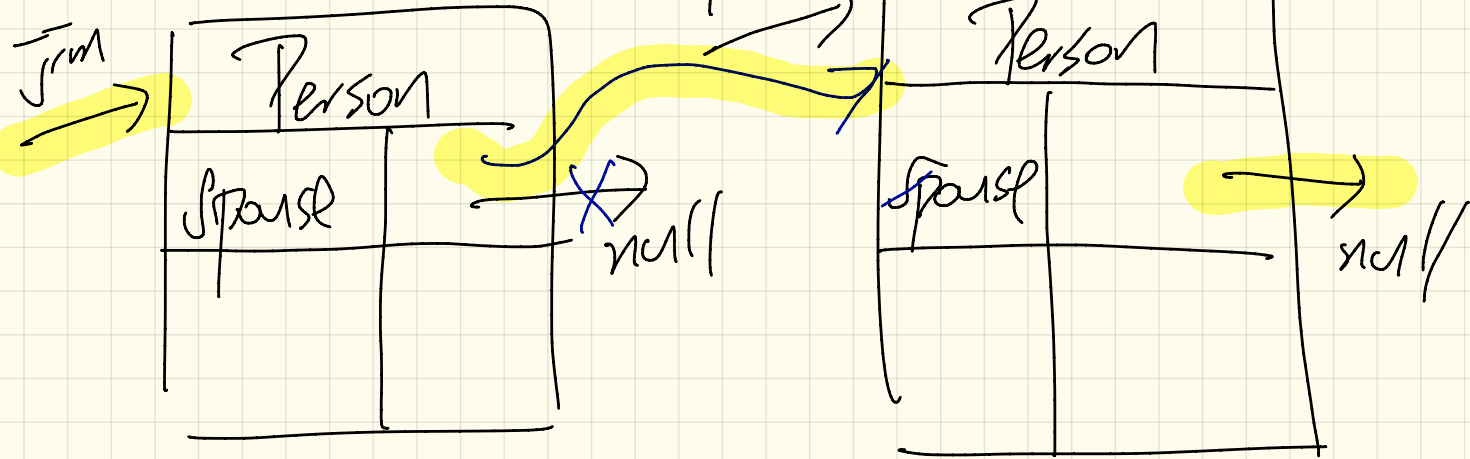
→ NullPointerException

P moveUp (2) 3

↓  
↘ still null

$\bar{j}m.spouse == fsa$  (true)

$\bar{j}m.spouse.spouse == \bar{j}m$  (false)



$\bar{j}m.spouse == null$   
 $fsa.spouse == null$

$\bar{j}m.married(fsa)$

```
class Person {
    String name;
    Person spouse;
```

```
if (this.spouse == null ||
    other.spouse == null) {
    Jim.marry(Lisa)
}
```

```
void marry (Person other) {
    this.spouse = other;
    other.spouse = this;
}

void divorce()
```

this.spouse.spouse = this;

```
class Point {
```

```
    void moveUpBy (int x) {
```

```
        this.x + = x;
    }
```

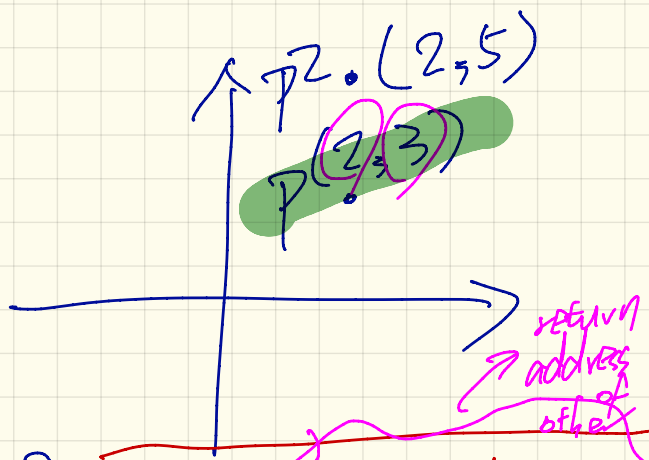
```
    Point movedUpBy (int x) {
```

```
        Point other = new Point(
            P.this.x, P.this.y);
```

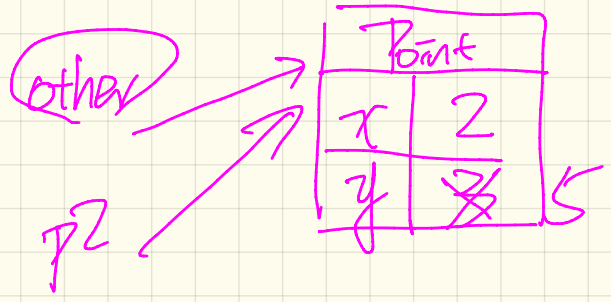
```
        other.moveUpBy (x);
```

```
        return other;
```

return the address of other



```
{ Point p2 = (P).movedUpBy(2); }
```



`ArrayList < Point > points =`

At runtime, 'points' stores the address of an `ArrayList` object. Every element of the `ArrayList` stores the address of some `Point` object.

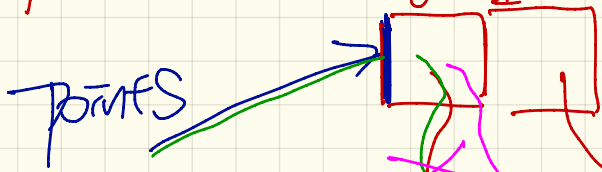
Point p1 = new Point(2, 3);

Point p2 = new Point(5, 7);

ArrayList< Point > points = new ArrayList<>();

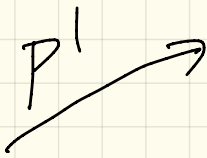
points.add(p1);

points.add(p2);

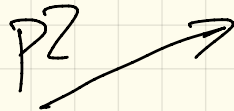


points.get(0) == p1 true  
points.get(1) == p2 true

points.set(0, p2)



Point	
x	2
y	3



Point	
x	5
y	7

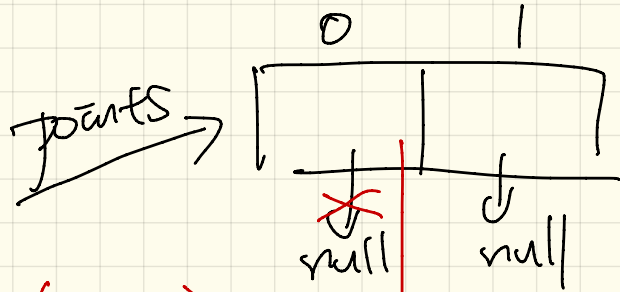
points.get(0) ==  
points.get(1) true

Point []

points ;

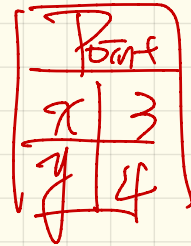
Point p = new Point  
(3, 4) ;

points = new Point [2] ;



points[0] =

new Point (3, 4) ;





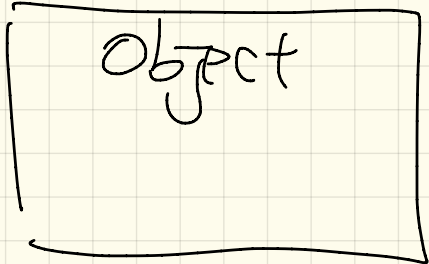
Point p1 = new Point(2, 3)

Point p2 = new Point(2, 3)

①  $p1 == p2$  false

②  $[ p1.x == p2.x \ \&\& \ p1.y == p2.y ]$  true

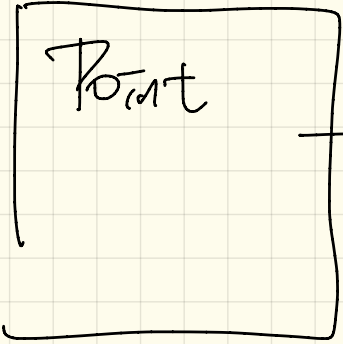
define a helper method "equals"  
p1.equals(p2)



PARENT  
class

```
boolean equals(Object o)
```

```
return this == o;
```



```
boolean equals(Object o)
```

```
Point equals(Object obj)
// any object
```

Point p1 = new

Point p2 = p1;

p1.equals(p2) ✓

p1.equals(null) ✗

String p3 = "(2,3)";

p1.equals(p3) ✗

Point (2,3);

Point p3 =

new Point  
(2,3);

p1.equals(p3) ✓

expanded!