CSE 11
Accelerated Intro to Programming
Lecture 11

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This lecture is being recorded

Announcements

- Quiz 11 due Friday @ 8am
- PA3 due tonight @ 11:59pm
- Survey 4 due Friday @ 11:59pm
- Week 6, 9, and finals week for take-home exams

```
interface Region {
  boolean contains(Point p);
}

class CircleRegion
  implements Region {
  …
  public boolean contains(Point p)
  { … }
}

class SquareRegion
  implements Region {
  …
  public boolean contains(Point p)
  { … }
}

class UnionRegion {
  Region r1, r2;
  UnionRegion(Region r1, Region r2) { … }
  public boolean contains(Point p) {
    return this.r1.contains(p) ||
           this.r2.contains(p);
  }
}
class ExamplesRegion {
  Region circ = new CircleRegion(new Point(10, 5), 4);
  Region square = new SquareRegion(new Point(5, 6), 8);
  UnionRegion ur = new UnionRegion(this.square, this.circ);
  boolean b1 = this.ur.contains(new Point(13, 5));
}
```

What is the value of the `b1` field?

20 A: true | C: error

4 B: false

Using Interfaces

- Add Region interface
- Update RectRegion & CircRegion

Intersect Region

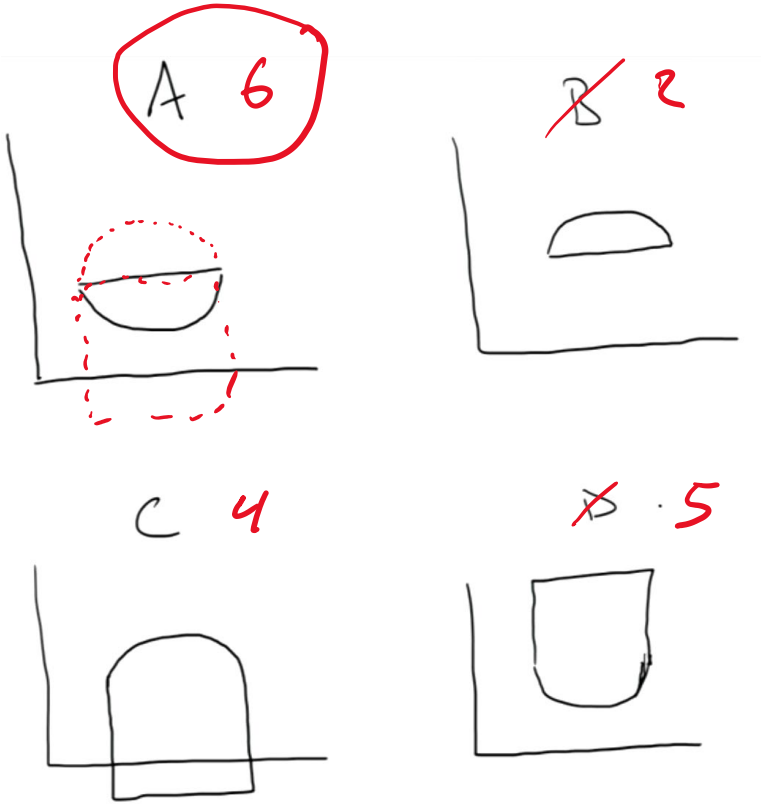
```
interface Region {
  boolean contains(Point p);
}
```

```
class IntersectRegion implements Region {
  Region r1;
  Region r2;
  IntersectRegion(Region r1, Region r2) {
    this.r1 = r1;
    this.r2 = r2;
  }
  public boolean contains(Point p) {
    return this.r1.contains(p) && this.r2.contains(p);
  }
}
```

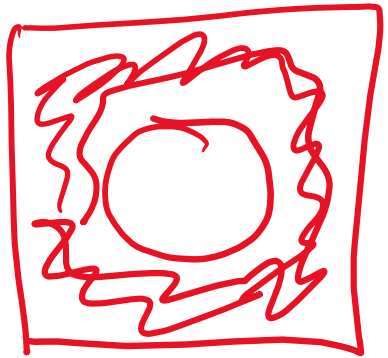
```
class IntersectRegion implements Region {
  …
  public boolean contains(Point p) {
    return this.r1.contains(p) && this.r2.contains(p);
  }
}

class ExamplesRegion {
  Region circ1 = new CircleRegion(new Point(10, 5), 4.0);
  Region sq = new SquareRegion(new Point(10, 1), 8.);
  Region ir = new IntersectRegion(this.circ1, this.sq);

  //What region is represented in toDraw?
  Region toDraw = ir;
}
```

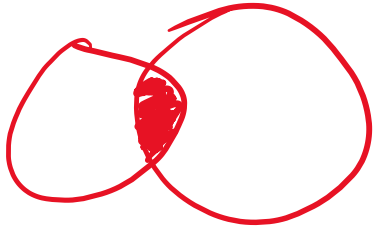


SubtractRegion



- Write a new class called SubtractRegion
  - That also implements Region
- Represents all the points in region1 that aren't in region2
  - Start with a shape and subtract another shape from it
    - Subtract a circle from another circle to create a ring
- Write the class
  - Fields and constructor
  - What does the contains method look like?

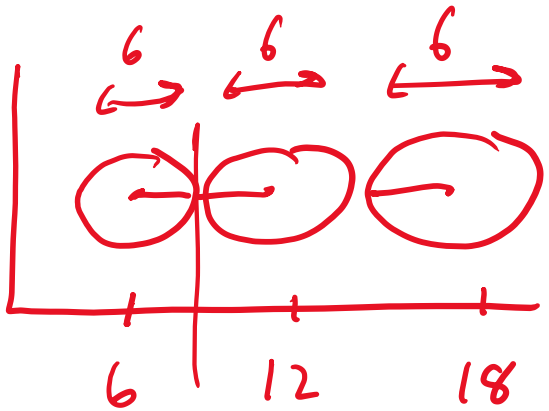
XOR - exclusive or



Negate

Something more complicated

- What if we wanted a region that was 3 circles next to each other:
- How could we construct an example of this?



radius = 3

Inheritance

- New terms
  - abstract class
  - extends