CS111 JEOPARDY: THE HOME VERSION

*The game that turns CS111 into CS***fun***11*

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Arrays

[1] This is the Java expression that denotes the number of elements in the array `A`.

[2] This is one advantage of representing a sequence of elements as an array rather than as a list.

[3] Suppose that B is an array of booleans. This is a sequence of statements that swaps the contents of the first and last slots of B.

[4] This is a definition of a `concatAll()` method that concatenates all of the elements of an array of strings into a single string. For example, suppose `a` is defined as follows:

```
String [] a = {"ab","cde","","f","ghij"};
```

Then `concatAll(a)` returns the string `"abcdefghij"`.

[5] This is a definition of a class method satisfying the following contract:

```
public IntList intArrayToList (int [] A);
```
Returns an `IntList` containing all of the elements of `A` in the same order.

Objects

[1] A class declaration typically includes these entities, used to keep track of an object's state.

[2] This keyword is used to signify a variable or method that is not tied to a specific instance of a class.

[3] This is a list of **all** the different **kinds** of (1) methods and (2) variables that can be in a Java class declaration.

[4] This is displayed in the Java Console window by an animation that contains a single sprite create via `new TextSprite(2,1)`, where the `TextSprite` class is defined as follows:

```
public class TextSprite extends Sprite {

  private int x = 17;

  public TextSprite (int a, int b) {x = 10*a + b;}

  public void updateState() {x = x/2 - 1;}

  public void drawState() {
    if (x > 0) System.out.println(2*x);
  }
}
```

[5] This is displayed in the Java Console window when the `main` method of the following `Counter` class is executed:

```
public class Counter {

  private static int c = 0;
  private int i;

  public Counter () {c = c + 1; i = 0;}

  public int print () {
    i = i + 1;
    System.out.println("c = " + c + "; i = " + i);}

  public void main (String [] args) {
    Counter a = new Counter(); a.print(); a.print();
    Counter b = new Counter(); b.print(); a.print();}}
```

Worlds

[1] Buggles love to eat these.

[2] Suppose that `w` is a `PictureWorld` picture of the wedge shown below in Figure 1. This is a `PictureWorld` expression that denotes the picture in Figure 2.

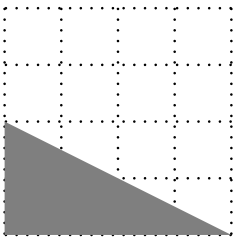

Figure 1

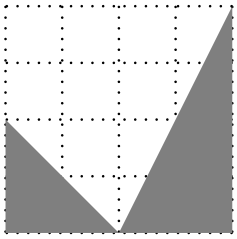

Figure 2

[3] This is the picture drawn in an applet by the following statements. (Indicate relevant coordinates in your picture.)

```
Graphics g = getGraphics();
Point p1 = new Point(10, 20);
Point p2 = new Point(30, 60);
g.setColor(Color.red);
g.drawOval(p1.x, p1.y, p1.y, p1.y);
g.drawRect(p1.x, p1.y, p2.x, p2.y);
Polygon p = new Polygon():
p.addPoint(p1.x, p1.y);
p.addPoint(p2.x, p2.y);
p.addPoint(p1.x, p2.y);
g.setColor(Color.green);
g.fillPoly();
```

[4] This is a definition of the buggle method satisfying the following contract:

`public boolean canGoForwardBy (int n);`
Returns `true` if the buggle would not encounter a wall in `forward(n)`, and `false` otherwise. Executing this method should leave the state of the buggle unchanged.

[5] This is the picture drawn by invoking the turtle method `pattern(40)` on a new turtle, where `pattern` is defined as follows:

```
public void pattern (int n) {
  if (n < 10) {
    fd(n)
  } else {
    pattern(n/2);
    lt();
    fd(n);
    bd(n);
    rt();
    pattern(n/2);}}
```

Lists

[**1**] When defining a recursive list method, a good strategy is to assume you can successfully invoke the method on this part of the list.

[**2**] This is one advantage of storing a sequence of elements in a list as opposed to an array.

[**3**] This list is the result of applying the following `mystery()` method to the list `[2, 3, 9, 5, 6, 4]`

```
public IntList mystery (IntList L){
  if(isEmpty(L)){
    return empty();
  } else if ((head(L) % 3) == 0) {
    return mystery(tail(L));
  } else {
    return prepend(2*head(L),
                   mystery(tail(L)));
  }
}
```

[**4**] How many *new* list nodes are created by the invocation `appendages(ns)`, where `ns` is the list `[1,2,3]`, and `appendages` is defined below:

```
public IntList appendages (IntList L) {
  if(isEmpty(L)) {
    return L;
  } else {
    return append(L, appendages(tail(L))); }}

public IntList append (IntList L1, IntList L2) {
  if(isEmpty(L1)) {
    return L2;
  } else {
    return prepend(head(L1), append(tail(L1), L2)); }}
```

[**5**] This is the definition of a method `doubles` that takes an `IntList L` as its single argument and returns an `IntListList` whose list elements are the the result of doubling all integers in the successive tails of `L`. For example:

```
doubles(IL.fromString("[7,2,3]"))
```

returns the following list of lists:

```
[[14, 4, 6], [4, 6], [6], []]
```

Use `IL.` and `ILL.` appropriately.

Bugs That Bite

[**1**] This is a bug in the following array method.

```
public static int product (int [] a) {
  int result = 1;
  for (int i = 0; i <= a.length; i++) {
    result = a[i] * result;
  }
  return result;
}
```

[**2**] This is a bug in the following turtle method;

```
public int spiral (int n) {
  if (n == 0) {
    return 0;
  } else {
    fd(n); lt();
    spiral(n/2);
    rt(); bd(n);
  }
}
```

[**3**] This is a bug in the following method to determine if an integer list is sorted:

```
public static boolean isSorted (IntList L) {
  if (isEmpty(L)) {
    return true;
  } else {
    return (head(L) <= head(tail(L)))
           && isSorted(tail(L));
  }
}
```

[**4**] These are *two* bugs in the following class declaration:

```
public class Circle {

  private Point center;
  private int radius;

  public Circle (Point c, int radius) {
    Point center = c;
    radius = radius; }

  public void draw (Graphics g) {
    g.drawOval(center.x - radius, center.y - radius,
               2*radius, 2*radius);}
}
```

[**5**] These are *two* bugs in the following `isMember` method for determining if a given integer is in an array of integers sorted from low to high:

```
// Assume a is sorted from low to high
public static boolean isMember (int n, int [] a) {
  int i = a.length - 1;
  while ((n > a[i]) && (i >= 0)) {
    i--;
  }
  return (i >= 0);
}
```

Potpourri

[1] In the Java Execution Model, this is created when an instance method is invoked.

[2] This special type of recursion can also be written as a while loop.

[3] Julius Caeser left out this crucial CS111 problem solving step in his famous military strategy.

[4] This is a list of all of the following that are Java expressions (as opposed to statements). (*Note:* all semicolons have been omitted so they don't provide a cue.)

```
(a) 1 + 2

(b) n == 0

(c) x = 0

(d) debby.forward(7)

(e) ellie.isOverBagel()

(f) if (x > 0) {return x} else {return -x}
```

[5] This is a definition of the buggle method satisfying the following contract:

> `public void forwardTurningLeft(int n);`
> Moves the buggle forward a total of `n` spaces, turning left whenever the buggle encounters a wall. (Turning does not count as "moving forward a space".)