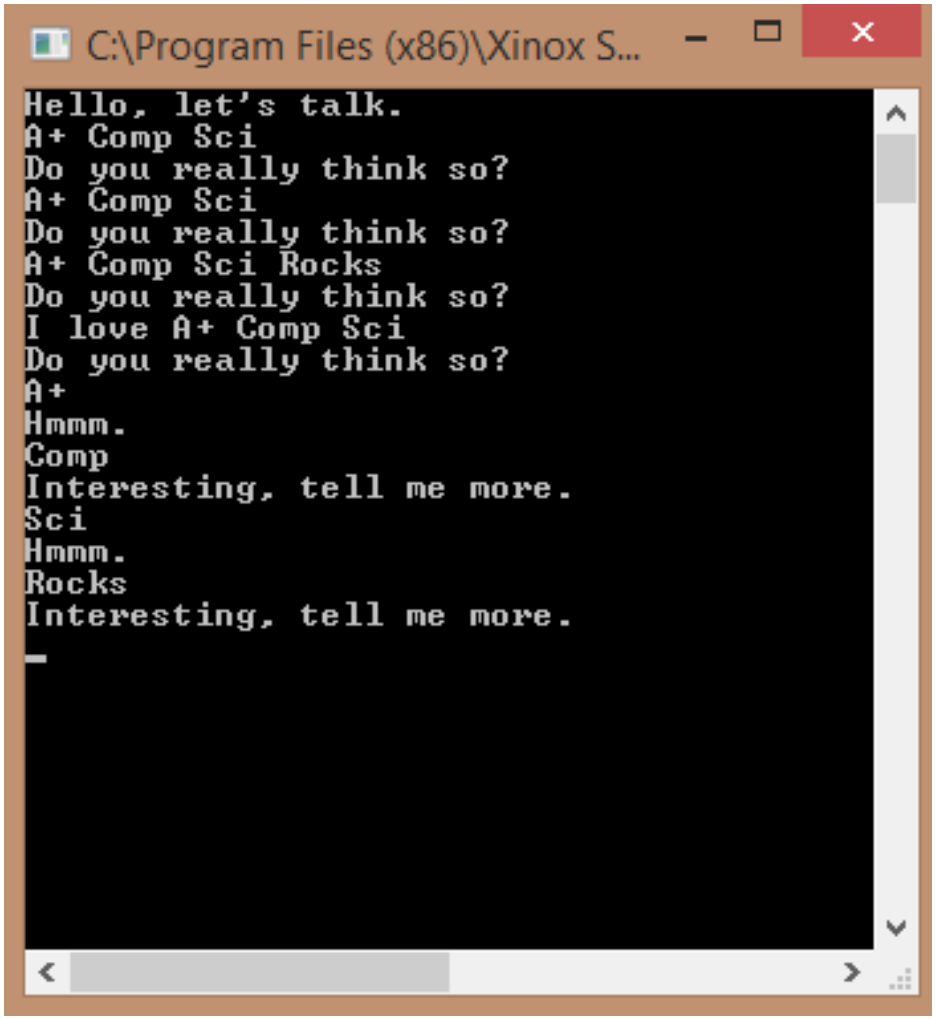
New AP CS A Labs

Magpie, PictureLab, and Elevens

Magpie



What is Magpie?

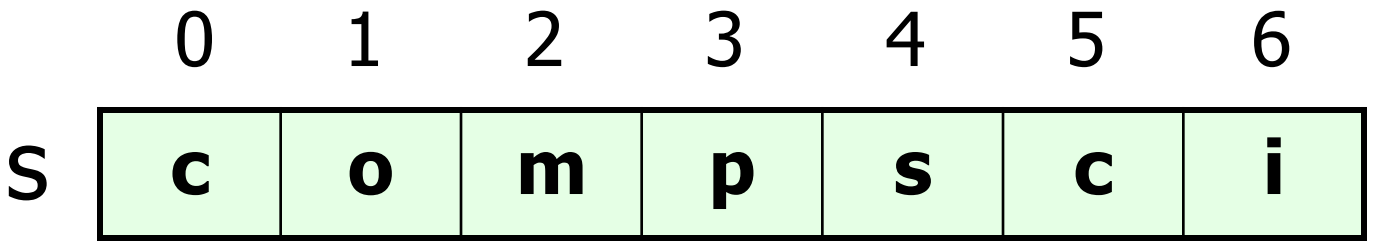
Magpie is a lab that focuses on classes, randomness, and Strings.

This lab will make sure that you know how to use the String methods substring and indexOf.

Both substring and indexOf have multiple forms as these methods have been overloaded.

What is a String?

String s = "compsci";



A string is a group of characters.
The first character in the group is at spot 0.

String

Methods from AP CS Subset

Name	Use
`int length()`	Returns length of String
`int indexOf(String str)`	Returns first position of str in the string if found, -1 if not found
`String substring(int from)`	Returns a substring of the string starting at from to length() – 1
`String substring(int from, int to)`	Returns a substring of the string starting at from to to – 1

substring()

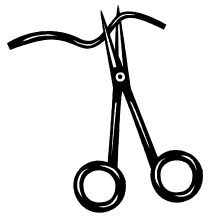
```
String s = "compsci";
String sub ="";

sub = s.substring(2);
out.println(sub);

sub = s.substring(2,5);
out.println(sub);

sub = s.substring(4,6);
out.println(sub);
```

OUTPUT

mpsci

mps

sc



	0	1	2	3	4	5	6
s	c	o	m	p	s	c	i

indexOf()

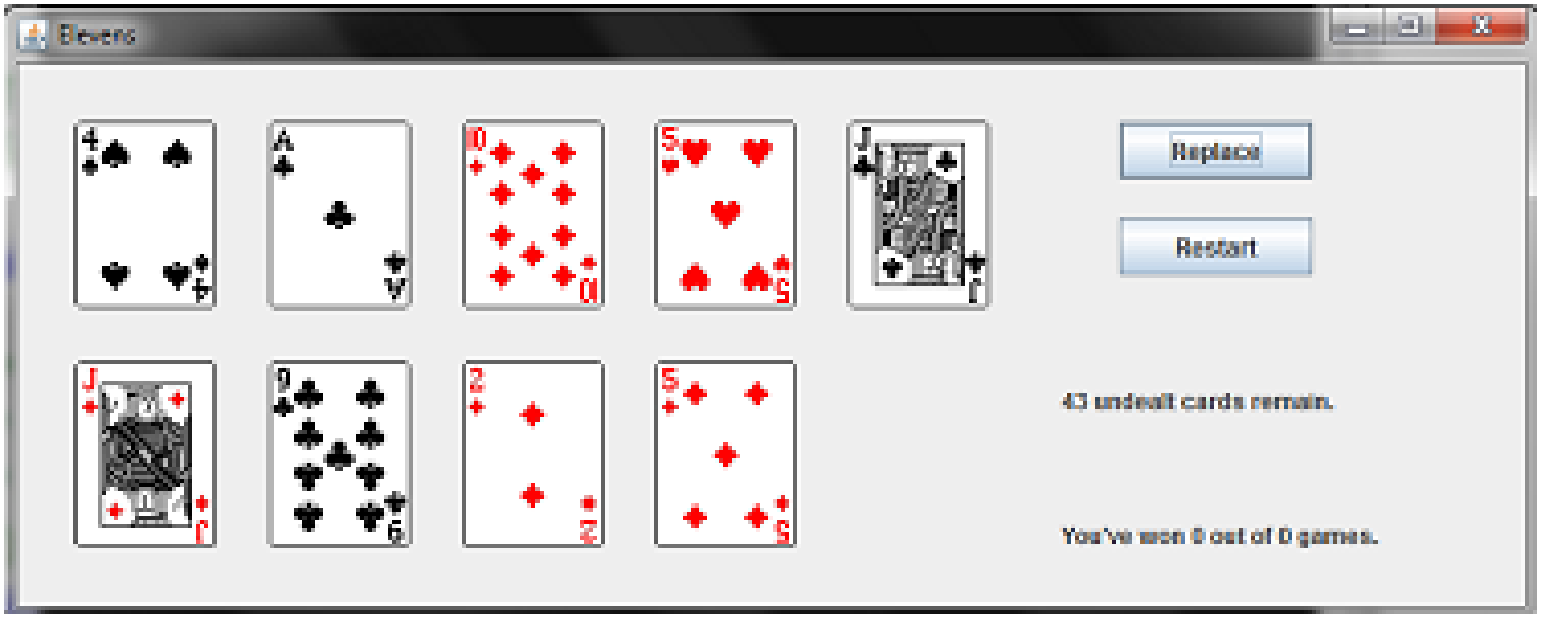
```
String s = "compsci";
int index = s.indexOf("mp");
out.println(index);
index = s.indexOf("c");
out.println(index);
index = s.indexOf("x");
out.println(index);
```

OUTPUT

2
0
-1

	0	1	2	3	4	5	6
s	c	o	m	p	s	c	i

Elevens



What is Elevens?

Elevens is a lab about classes and Lists.

List< SomeClass> is a major concept being tested by the Elevens lab.

Elevens is a multi-class project that uses a Card and Deck class to simulate the playing of cards.

Lists

```
List<String> ray;
ray = new ArrayList<String>();
ray.add("hello");
ray.add("whoot");
ray.add("contests");
out.println(ray.get(0).substring(0, 1));
out.println(ray.get(2).substring(0 ,1));
```

OUTPUT

h

c

ray stores String references.

```
public class Dog
{
  private int age;
  private String name;

  public Dog( String n, int a ) {
    age = a;
    name = n;
  }

  public int getAge()   {
    return age;
  }

  public String getName()   {
     return name;
  }

  public String toString()   {
    return "Dog - " + name + " " + age;
  }
}
```

Basic Dog Class

List of References

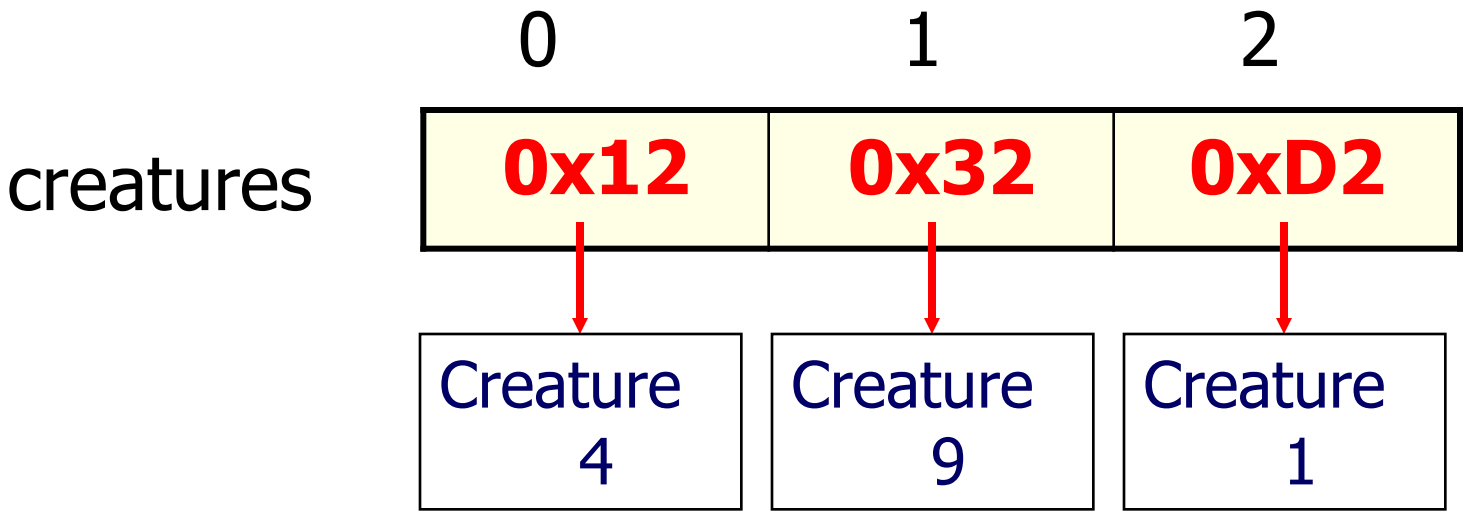
```
List<Dog> ray;
ray = new ArrayList<Dog>();

ray.add( new Dog( "fred", 11) );
ray.add( new Dog( "ann", 21) );

System.out.println( ray );
```

OUTPUT

[Dog - fred 11, Dog - ann 21]

List of References

```
List<Creature> creatures;
creatures  = new ArrayList<Creature>();
creatures.add(new Creature(4));
creatures.add(new Creature(9));
creatures.add(new Creature(1));
```



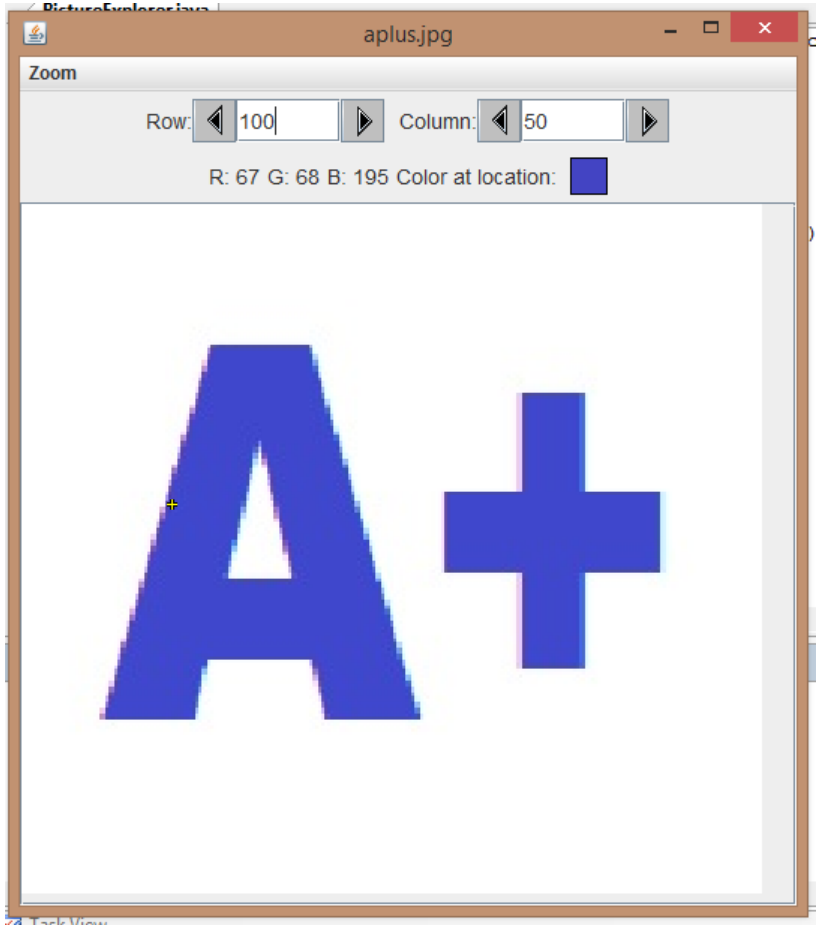
ArrayList

frequently used methods

Name	Use
add(item)	adds item to the end of the list
add(spot,item)	adds item at spot – shifts items up->
set(spot,item)	put item at spot z[spot]=item
get(spot)	returns the item at spot return z[spot]
size()	returns the # of items in the list
remove()	removes an item from the list
clear()	removes all items from the list

```
import java.util.ArrayList;
```

Picture Lab



What is Picture Lab?

PictureLab is a lab that focuses on matrices.

Matrices are arrays of arrays. The PictureLab will focus heavily on this concept.

Matrices can store references. PictureLab will use a matrix of references.

Searching matrices is also tested.

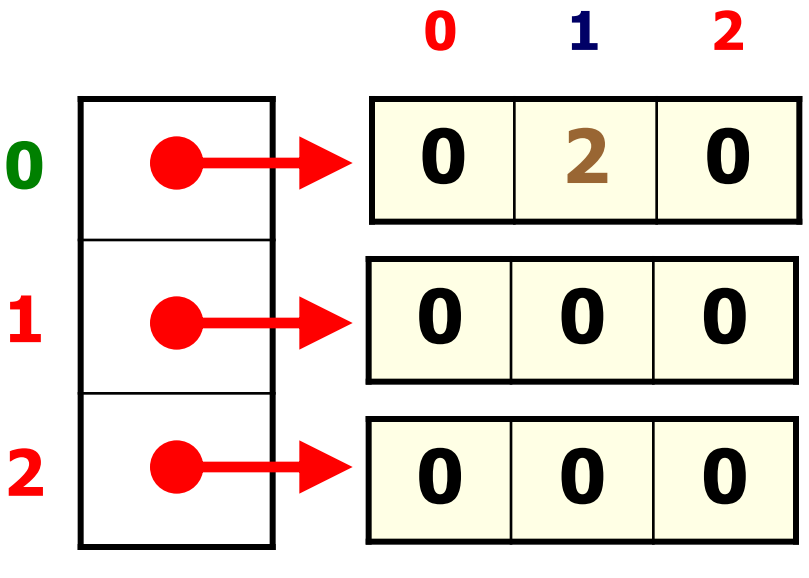
What is a matrix?

A matrix is an array of arrays.

```
int[][] mat = new int[3][3];
mat[0][1]=2;
```

Which array?

Which spot?



```
public class Dog
{
  private int age;
  private String name;

  public Dog( String n, int a ) {
    age = a;
    name = n;
  }

  public int getAge()   {
    return age;
  }

  public String getName()   {
     return name;
  }

  public String toString()   {
    return "Dog - " + name + " " + age;
  }
}
```

Basic Dog Class

Matrix of References

```
Dog[][] herd;
herd = new Dog[3][3];

herd[0][0] = new Dog( "fred", 11) ;
herd[1][2] = new Dog( "ann", 21) ;

System.out.println( herd[2][2] );
System.out.println( herd[0][0] );
```

OUTPUT

null
fred 11

Searching a Matrix

```
int[][] mat = {{5,7},{5,3,4,6},{0,8,9}};
int count = 0;
for( int[] row : mat )
{
  for( int num : row )
  {
    if( num == 5 )
      count++;
  }
}
System.out.println("5 count = "  + count);
```

OUTPUT

```
5 count = 2
```

What is a Picture?


```
public static void main(String[] args)
{
  Picture aplusPic = new Picture("aplus.jpg");
  aplusPic.explore();
  aplusPic.zeroBlue();
  aplusPic.explore();
}
```

Start work on the Labs