A+ Computer Science

AP REVIEW

2019 AP CS A EXAM

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Multiple Choice

-answer the easiest question 1st

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-bubble answers on answer sheet as you go

-answer every question

-keep track of your time - 90 minutes

Free Response

-Read all 4 questions before writing anything

-answer the easiest question 1st

-most times question 1 is the easiest

-see if part B calls part A and so on

-many times part C consists of A and B calls

-write something on every question

-write legibly / use PENCIL!!!!!!!!!!

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Free Response

-When writing methods

  -use parameter types and names as provided

  -do not redefine the parameters listed

  -do not redefine the methods provided

  -return from all return methods

  -return correct data type from return methods

Free Response

-When writing a class or methods for a class

  -know which methods you have

  -know which instance variables you have

  -check for public/private on methods/variables

  -return from all return methods

  -return correct data type from return methods

Free Response

-When extending a class

  -know which methods the parent contains

  -have the original class where you can see it

  -make sure you have super calls

  -check for public/private on methods/variables

  -make super calls in sub class methods as needed

Free Response Topics

Algorithms / Logic
– ifs, loops, methods

Make a Class
– create a class

Array/ArrayList
– get,set,remove,add,size - [],length

Matrices
– nested loops - array of arrays concepts

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Free Response Question 1

Algorithms / Logic

Algorithms / Logic

Algorithm problems often use array and strings, but like this year, they sometimes just use simple loops and method calls.

Algorithms / Logic

```
for(int aplus=1; aplus<7; aplus+=2)
{
  out.println("comp");
  out.println( aplus );
}
```

OUTPUT

```
comp
1
comp
3
comp
5
```

Algorithms / Logic

```
int run=25;
while(run>=10)
{
   out.println(run);
   out.println("loop");
   run=run-5;
}
```

OUTPUT

```
25
loop
20
loop
15
loop
10
loop
```

```
public static numberOfLeapYears( int year1, int year2 )
{
  int count = 0;
  for( int aplus = year1; aplus<=year2; aplus++)
  {
    if( isLeapYear( aplus ) )
      count++;
  }
  return count;
}
```

2019 Question 1 Part A

```
public static int dayOfWeek( int m, int d, int y )
{
   return ( firstDayOfYear( y ) +
       dayOfYear( m, d, y ) – 1 ) % 7;
}
```

2019 Question 1 Part B

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Free Response Question 2

Make a class

Make a Class

```
public Triangle(int a, int b, int c)
{
   sideA=a;
   sideB=b;
   sideC=c;
}
```

Constructors are similar to methods. Constructors set the properties of an object to an initial state.

Make a Class

```
public void setSideA(int a )
{
    sideA=a;
}
```

Modifier methods are methods that change the properties of an object.

Make a Class

```
public int getSideA()
{
  return sideA;
}
```

Accessor methods are methods that retrieve or grant access to the properties of an object, but do not make any changes.

Make a Class

```
public class Triangle
{
   private int sideA;
   private int sideB;
   private int sideC;
```

Instance variables store the state information for an object.

```
public class StepTracker
{
  private int steps, aDays, minSteps, days;

  public StepTracker(int m) {
    minSteps=m;
    steps=aDays=days=0;
  }
  public int activeDays() {
    return aDays;
  }
  public double averageSteps() {
    return steps==0?0.0:(double)steps/days;    //could just use an if
  }                                             //felt like living on
  public void addDailySteps(int st) {           //the wild side
    steps+=st;
    days++;
    if(st>=minSteps) {
      aDays++;
   }
  }
}
```

Make a Class

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Free Response Question 3

ArrayList

ArrayList

A typical ArrayList question involves putting something into an ArrayList and removing something from an ArrayList.

ArrayList

Arraylist is a class that houses an array.
An ArrayList can store any type.
All ArrayLists store the first reference at spot / index position 0.

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;
```

ArrayList

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

OUTPUT

```
h
c
```

ray stores String references.

ArrayList

```
int spot=list.size()-1;
while(spot>=0)
{
   if(list.get(spot).equals("killIt"))
      list.remove(spot);

   spot--;

}
```

ArrayList

```
for(int spot=list.size()-1; i>=0; i--)
{
   if(list.get(spot).equals("killIt"))
      list.remove(spot);
}
```

ArrayList

```
int spot=0;
while(spot<list.size())
{
   if(list.get(spot).equals("killIt"))
      list.remove(spot);
   else
      spot++;
}
```

```
public ArrayList<String> getDelimitersList(
                                        String[] tokens)
{
    ArrayList<String> fun;
    fun = new ArrayList<String>();
    for( String s : tokens )
    {
       if( s.equals( openDel ) ||
             s.equals( closeDel) )
          fun.add( s );
    }
    return fun;
}
```

2019
Question 3
Part A

```
public boolean isBalanced(ArrayList<String> delimiters)
{
    int closeCount = 0;
    int openCount = 0;
    for( String s : delimiters )
    {
        if( s.equals( openDel ) )
        {
          openCount++;
        }
        else if( s.equals( closeDel ) )
        {
          closeCount++;
        }
        if( closeCount > openCount )
        {
          return false;
        }
    }
    return closeCount ==  openCount;
}
```

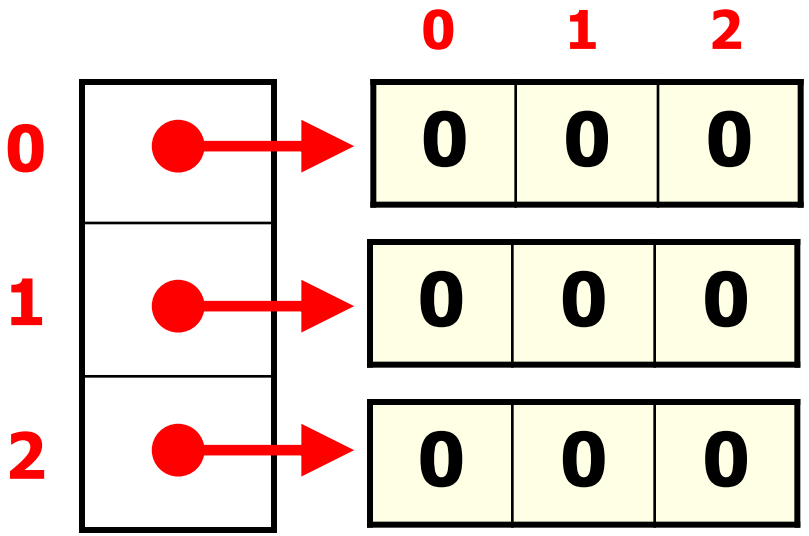
2019 Question 3 Part B

Free Response Question 4

Matrices

Matrices

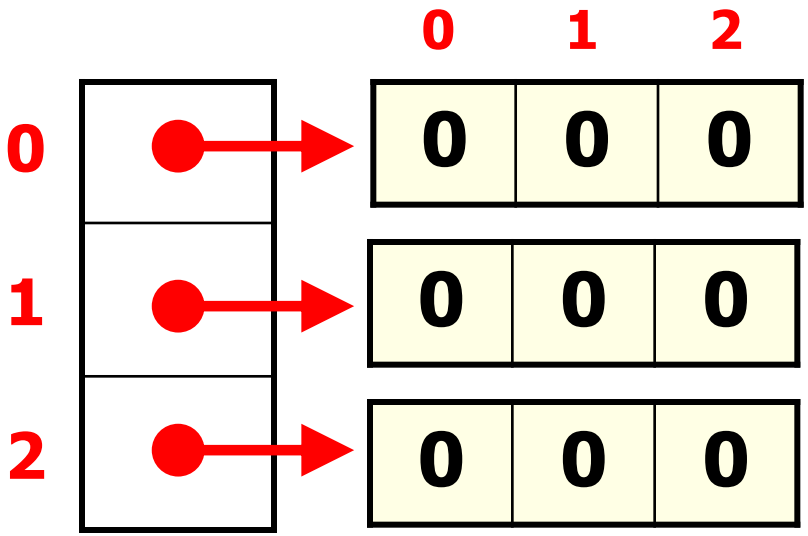
Typically, 1 question on the A test free response will require that students manipulate a 2-dimensional array.



Matrices

A matrix is an array of arrays.

```
int[][] mat = new int[3][3];
```



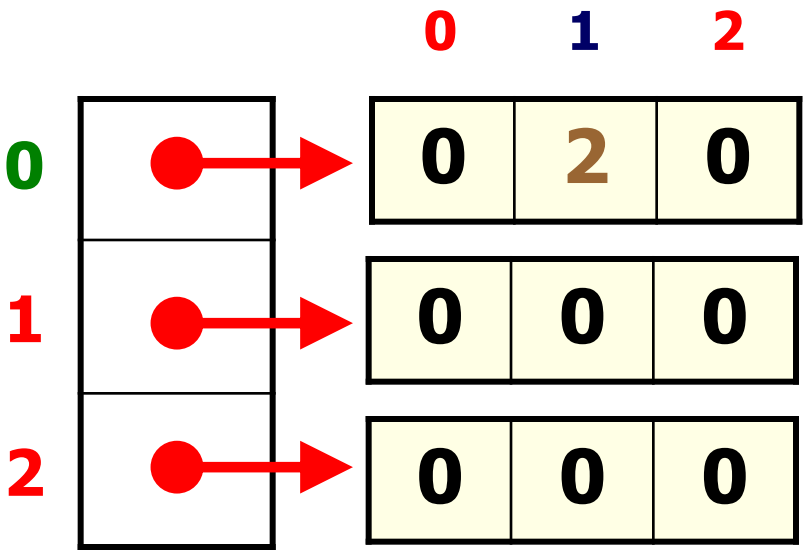
Matrices

A matrix is an array of arrays.

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

Which array?

Which spot?



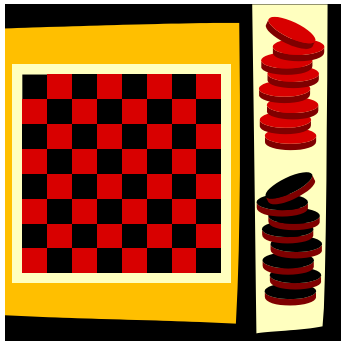
Matrices

	0	1	2	3	4
0	0	0	0	5	0
1	0	0	0	0	0
2	0	0	7	0	0
3	0	0	0	0	0
4	0	3	0	0	0

mat[2][2]=7;

mat[0][3]=5;

mat[4][1]=3



Matrices

```
for( int r = 0; r < mat.length; r++)
{
  for( int c = 0; c < mat[r].length; c++)
  {
       mat[r][c] = r*c;
  }
}
```

if mat was 3x3

0	0	0
0	1	2
0	2	4

Matrices

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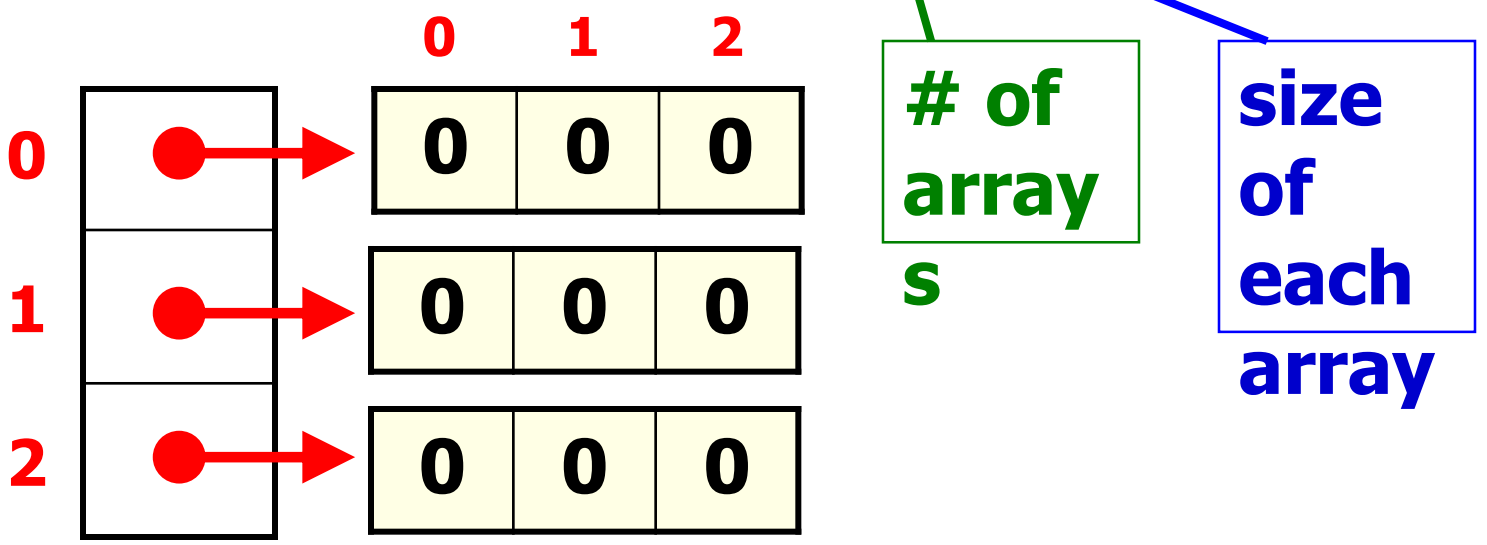

Matrices – for each

```
int[][] mat = {{5,7},{5,3,4,6},{0,8,9}};

for( int[] row : mat )
{
  for( int num : row )
  {
    System.out.print( num + " ");
  }
  System.out.println();
}
```

OUTPUT

```
5 7
5 3 4 6
0 8 9
```

Matrices – for loop

```
int[][] mat = {{5,7},{5,3,4,6},{0,8,9}};

for( int r = 0; r < mat.length; r++ )
{
  for( int c = 0; c < mat[r].length; c++ )
  {
    System.out.print( mat[r][c] + " ");
  }
  System.out.println();
}
```

OUTPUT

```
5 7
5 3 4 6
0 8 9
```

```
public LightBoard(int numRows, int numCols)
{
    lights=new boolean[numRows][numCols];
    for(int r=0;r<numRows;r++)
      for(int c=0;c<numCols;c++)
          lights[r][c]=(int)(Math.random()*10)<=3;
}
```

2019 Question 4 part A

```
public boolean evaluateLight(int row, int col)
{
    boolean light=lights[row][col];
    int n=0;
    for(int r=0;r<lights.length;r++)
        if(lights[r][col])
            n++;
    if(light && n%2==0)
      return false;
    else if(!light && n%3==0)
      return true;
    return light;
}
```

2019
Question 4
part B

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