

A+ Computer Science

AP REVIEW

2018 AP CS A EXAM

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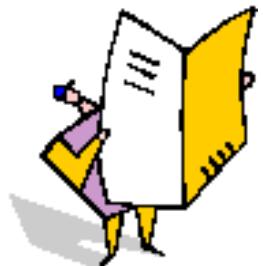
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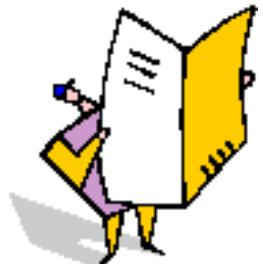
Multiple Choice

- answer the easiest question 1st**
- work through the test more than once**
- use the test to take the test**
- work more time intensive problems last**
- 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!!!!!!!!!**
- keep track of your time**



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

- When extending abstract / implementing interface**
 - 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**
 - implement all abstract methods in sub class**

Free Response Topics

Algorithms

- ifs and loops

ArrayList

- get, set, remove, add, size

Make a Class – Implement an Interface

- create a class that implements an interface

Arrays and Matrices

- nested loops - array of arrays concepts

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Free Response Question 1

**Algorithm /
Logic**

Algorithm / Logic

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

Algorithm / Logic

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

OUTPUT

comp
1
comp
3
comp
5

Algorithm / 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 boolean simulate()
{
    int temp = maxHops;
    int loc = 0;
    while( temp > 0 && loc >= 0
          && loc < goalDistance )
    {
        loc = loc + hopDistance();
        temp--;
    }
    if( loc >= goalDistance )
        return true;
    return false;
}
```

2018
Question 1
Part A

```
public double runSimulations( int num )
{
    double pos = 0;
    for( int i = 0; i < num; i++ )
    {
        if( simulate() )
            pos++;
    }
    return pos / num;
}
```

2018
Question 1
Part B

Free Response Question 2

ArrayList

ArrayList

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

34

76

-8

44

22

-998

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.

34

76

-8

44

22

-998

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 WordPairList(String[] words)
{
    allPairs = new ArrayList<WordPair>();
    for( int i = 0; i < words.length; i++ )
    {
        for( int j = i + 1; j < words.length; j++ )
        {
            allPairs.add( new WordPair( words[i],
                words[j] ) );
        }
    }
}
```

2018
Question 2
Part A

```
public int numMatches()
{
    int count = 0;
    for( WordPair item : allPairs )
    {
        if(item.getFirst().equals(item.getSecond()))
            count++;
    }
    return count;
}
```

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Question 2
Part B

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Free Response

Question 3

**Implement an
Interface**

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.**

Abstract / Interfaces

public interface Exampleable

{

int writeIt(Object o);

int x = 123;

}

Methods are public abstract!

Variables are public static final!

Abstract / Interfaces

public interface Exampleable

{

public abstract int writeIt(Object o);
public static final int x = 123;

}

Methods are public abstract!
Variables are public static final!

Abstract / Interfaces

An interface is a list of abstract methods that must be implemented.

An interface may not contain any implemented methods.

Interfaces cannot have constructors!!!

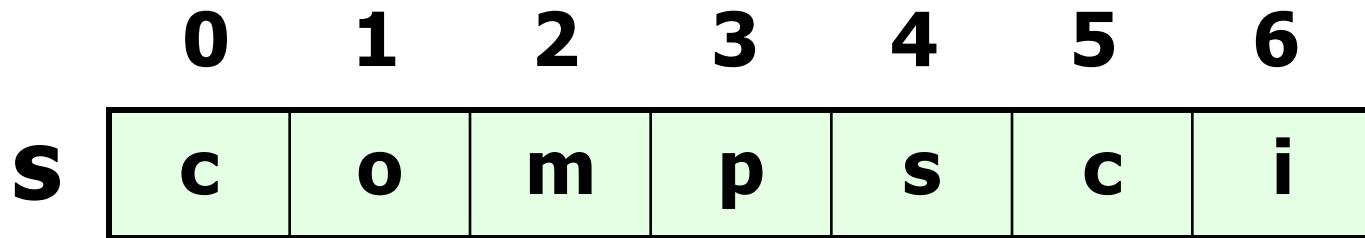
Abstract / Interfaces

Interfaces are typically used when you know what you want an Object to do, but do not know how it will be done.

If only the behavior is known, use an interface.

String Love

String s = "compsci";



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

String

frequently used methods

Name	Use
substring(x,y)	returns a section of the string from x to y not including y
substring(x)	returns a section of the string from x to length-1
length()	returns the # of chars
charAt(x)	returns the char at spot x
indexOf(c)	returns the loc of char c in the string, searching from spot 0 to spot length-1
lastIndexOf(c)	returns the loc of char c in the string, searching from spot length-1 to spot 0

String

frequently used methods

Name	Use
equals(s)	checks if this string has same chars as s
compareTo(s)	compares this string and s for >,<, and ==
trim()	removes leading and trailing whitespace
replaceAll(x,y)	returns a new String with all x changed to y
toUpperCase()	returns a new String with uppercase chars
toLowerCase()	returns a new String with lowercase chars

String Love

```
String sent = "alligators rule";
String find = "gato";
```

```
System.out.println( sent.indexOf( find ) );
System.out.println( sent.indexOf( "dog" ) );
System.out.println( sent.substring( 3 , 6 ) );
System.out.println( sent.substring( 6 ) );
```

OUTPUT

```
4
-1
iga
tors rule
```

```
public class CodeWordChecker implements StringChecker
{
    private int min;
    private int max;
    private String not;

    public CodeWordChecker( int a, int b, String c )
    {
        min = a;
        max = b;
        not = c;
    }

    public CodeWordChecker( String c )
    {
        min = 6;
        max = 20;
        not = c;
    }

    public boolean isValid( String str )
    {
        if( str.indexOf( not ) > -1 )
            return false;
        if( str.length() < min )
            return false;
        if( str.length() > max )
            return false;
        return true;
    }

    public String toString()
    {
        return "" + min + " " + max + " " + not;
    }
}
```

Make a Class

2017

Question 3

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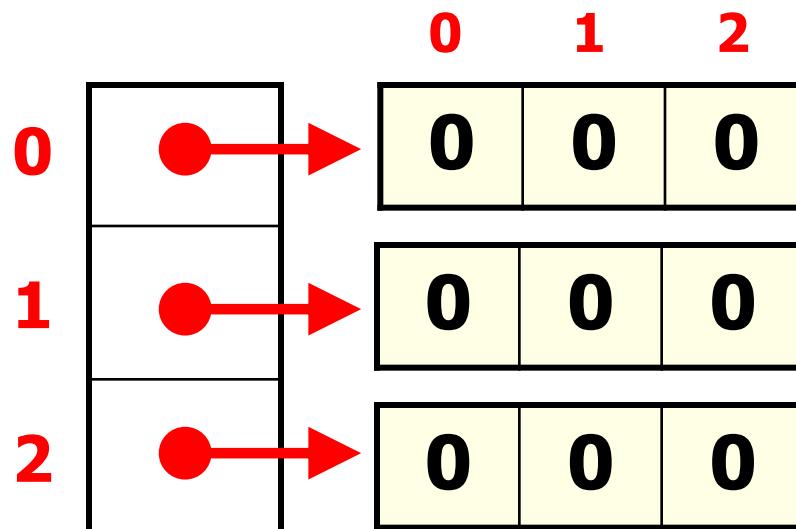
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Free Response Question 4

Matrix

Matrices

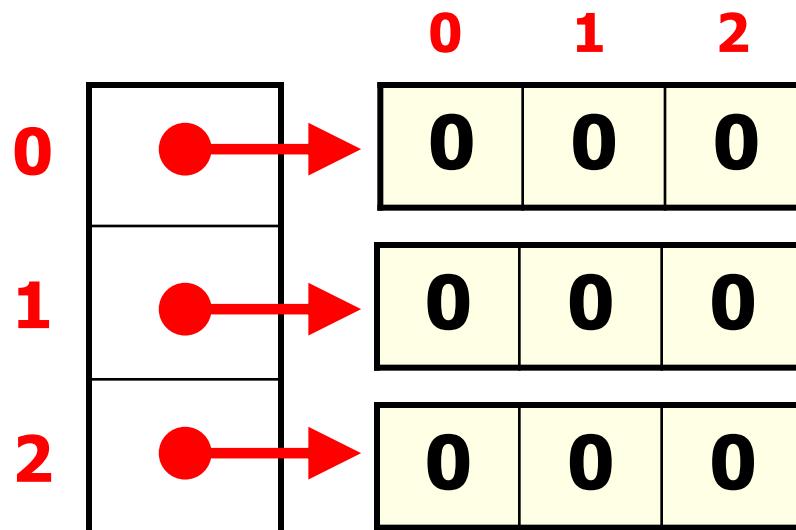
Typically, 1 question on the A test free response will require that students manipulate a 2-dimensional array.



Matrices

A matrix is an array of arrays.

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



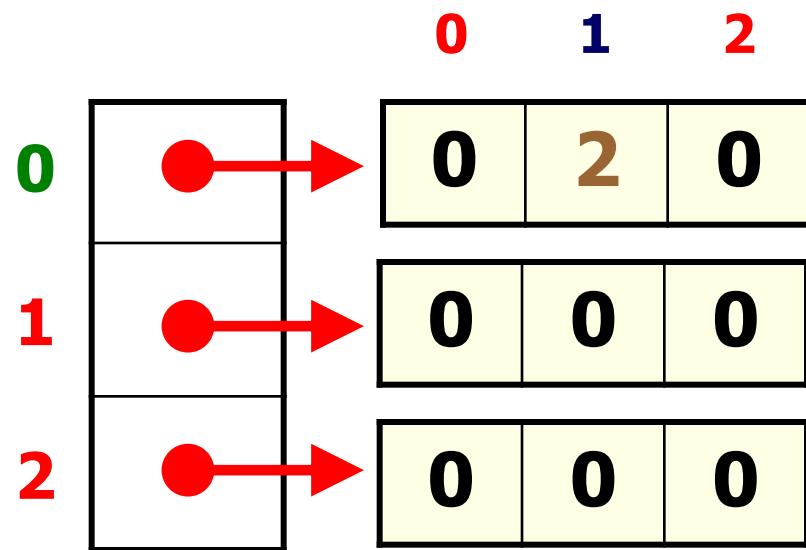
Matrices

A matrix is an array of arrays.

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

Which array?

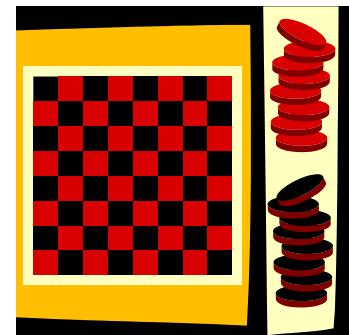
Which spot?



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;  
    }  
}
```

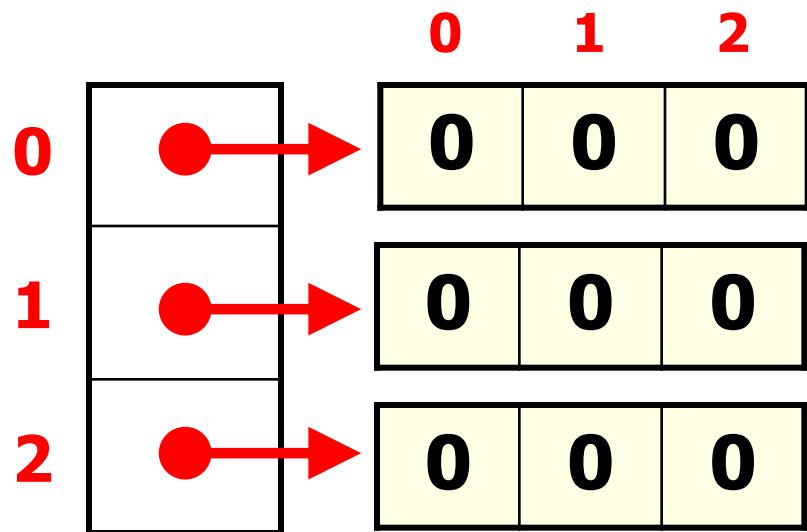
if mat was 3x3

0	0	0
0	1	2
0	2	4

Matrices

A matrix is an array of arrays.

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



of array
s

size of each array

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 static int[] getColumn( int[][] arr2D, int c )
{
    int[] col = new int[arr2D.length];
    for( int r = 0; r < arr2D.length; r++ )
    {
        col[r] = arr2D[r][c];
    }
    return col;
}
```

2018
Question 4
part A

```
public static boolean isLatin( int[][] square )
{
    if( containsDuplicates( square[0] ) )
        return false;
    for( int i = 1; i < square.length; i++ )
    {
        if( ! hasAllValues( square[0], square[i] ) )
            return false;
    }
    for( int i = 0; i<square[0].length; i++ )
    {
        if( ! hasAllValues( square[0] , getColumn( square, i) ) )
            return false;
    }
    return true;
}
```

2018
Question 4
part B.1

```
public static boolean isLatin( int[][] square )
{
    if( containsDuplicates( square[0] ) )
        return false;

    for( int i = 1; i < square.length; i++ )
    {
        if( ! hasAllValues( square[0], square[i] ) )
            return false;
        if( ! hasAllValues( square[0] , getColumn( square, i) ) )
            return false;
    }
    return true;
}
```

Probably not the most common solution.

2018
Question 4
part B.2

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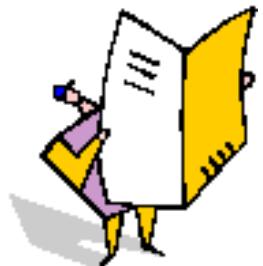
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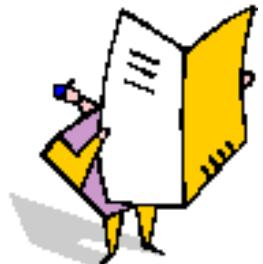
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Free Response

-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

- When extending abstract / implementing interface**
 - 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**
 - implement all abstract methods in sub class**

Free Response Topics

Algorithms

- ifs and loops

ArrayList

- get, set, remove, add, size

Make a Class – Implement an Interface

- create a class that implements an interface

Arrays and Matrices

- nested loops - array of arrays concepts

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