

A+ Computer Science

AP REVIEW

2022 AP CS A EXAM

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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 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 int getScore()  
{  
    int pts = 0;  
    if( one.goalReached() )  
    {  
        pts += one.getPoints();  
        if( two.goalReached() )  
        {  
            pts += two.getPoints();  
            if( three.goalReached() )  
                pts += three.getPoints();  
        }  
    }  
    if( isBonus() )  
        return pts * 3;  
    return pts;  
}
```

//There are other options as well.

2022

Question 1

Part A

```
public int playManyTimes( int num )  
{  
    int s = 0;  
    for( int i = 0; i < num; i++)  
    {  
        play();  
        if( getScore() > s )  
            s = getScore();  
    }  
    return s;  
}
```

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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 TextBook extends Book
```

```
{
```

```
    private int ed;
```

```
    public TextBook( String t, double p, int e )
```

```
    {
```

```
        super( t, p );
```

```
        ed = e;
```

```
    }
```

```
    public String getBookInfo()
```

```
    {
```

```
        return super.getBookInfo() + "-" + ed;
```

```
    }
```

```
    public int getEdition()
```

```
    {
```

```
        return ed;
```

```
    }
```

```
    public boolean canSubstituteFor( TextBook other )
```

```
    {
```

```
        return getTitle().equals( other.getTitle() ) && getEdition() >=
```

```
            other.getEdition();
```

```
    }
```

```
}
```

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.

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 $z[\text{spot}] = \text{item}$
get(spot)	returns the item at spot $\text{return } z[\text{spot}]$
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 double getAverageRating()  
{  
    double a = 0;  
    for( Review r : stuff )  
        a += r.getRating();  
    return a / stuff.length;  
}
```

2022
Question 3
Part A

```
public ArrayList<String> collectComments()
{
    ArrayList<String> ra;
    ra = new ArrayList<String>();

    for( int i = 0; i < stuff.length; i++ )
    {
        String s = stuff[i].getComment();
        if( s.endsWith("!") || s.endsWith(".") )
            ra.add( i + "-" + s );
        else if ( s.contains("!") )
            ra.add( i + "-" + s + "." );
    }
    return ra;
}
```

2022
Question 3
Part B.1

```
public ArrayList<String> collectComments()
{
    ArrayList<String> ra;
    ra = new ArrayList<String>();

    for( int i = 0; i < stuff.length; i++ )
    {
        String s = stuff[i].getComment();
        if(s.length()>0)
        {
            String b = s.substring(s.length()-1);
            if( b.equals("!") || b.equals(".") )
                ra.add( i + "-" + s );
            else if( s.indexOf("!")>-1 )
                ra.add( i + "-" + s + "." );
        }
    }
    return ra;
}
```

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Question 3

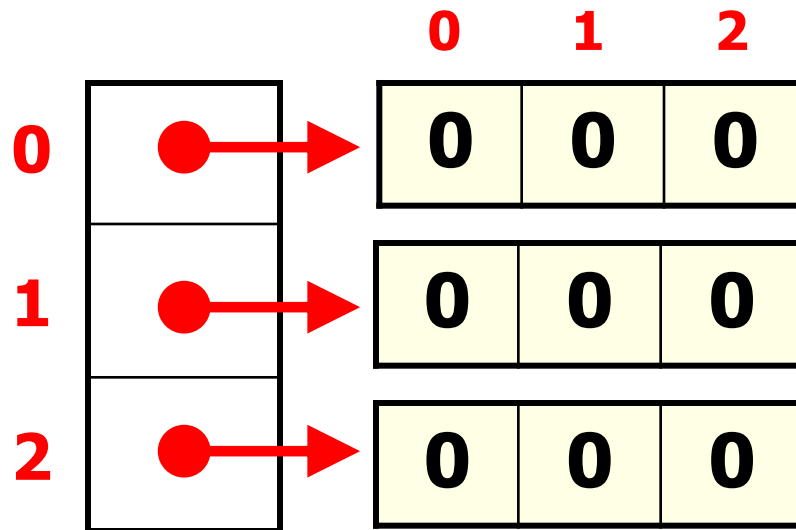
Part B.2

Free Response Question 4

Matrices

Matrices

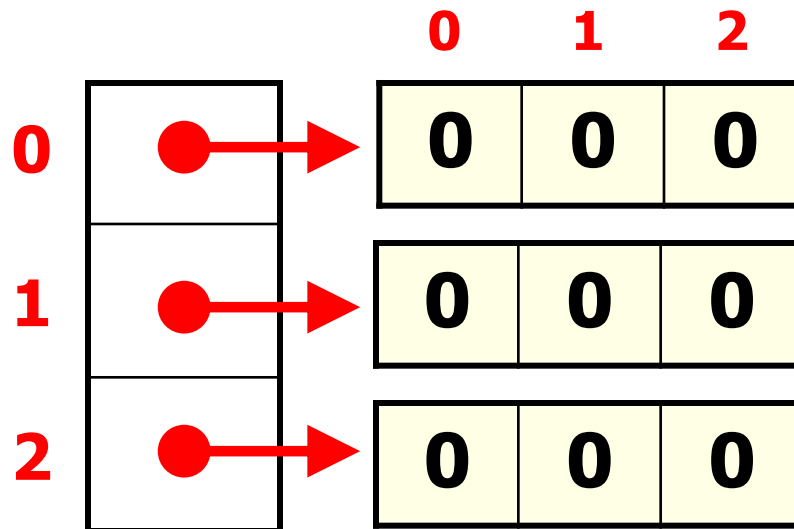
Typically, 1 question on the A test free response will require that students manipulate a 2-dimensional array.



Matrices

A matrix is an array of arrays.

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



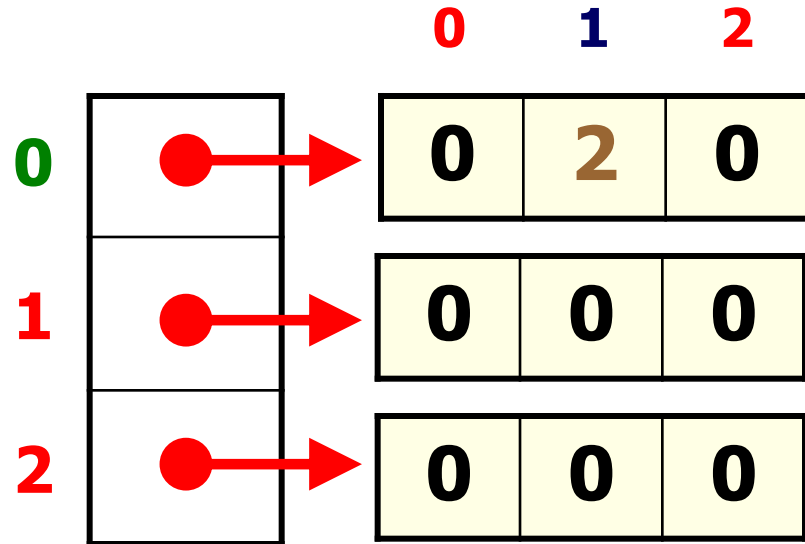
Matrices

A matrix is an array of arrays.

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

Which
array?

Which
spot?



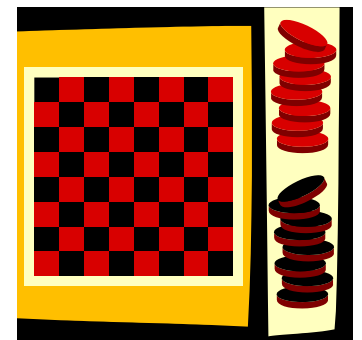
Matrices

	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;  
    }  
}
```

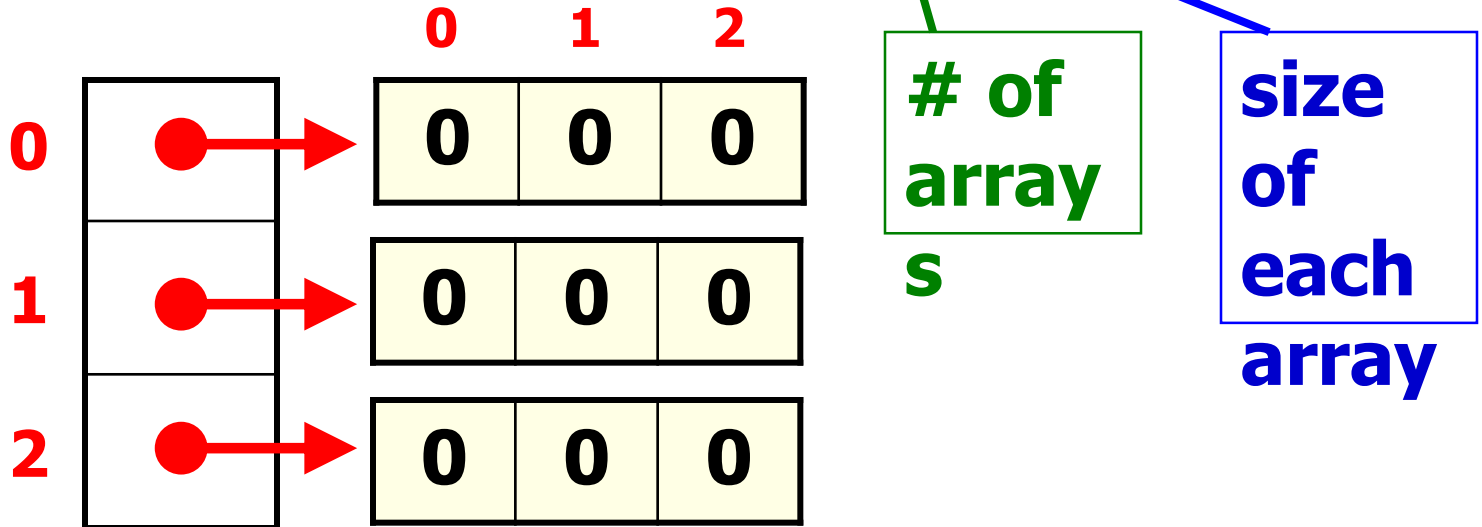
if mat was 3x3

0	0	0
0	1	2
0	2	4

Matrices

A matrix is an array of arrays.

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



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

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Question 4

part A

```
public void repopulate()
{
    for( int r = 0; r < grid.length; r++ )
    {
        for( int c = 0; c < grid[r].length; c++ )
        {
            int val = (int)( Math.random() * MAX ) + 1;
            while( val % 10 != 0 || val % 100 == 0 )
            {
                val = (int)( Math.random() * MAX ) + 1;
            }
            grid[r][c] = val;
        }
    }
}
```

```
public int countIncreasingCols()
{
    int cnt = 0;
    for( int c = 0; c < grid[0].length; c++ )
    {
        boolean g = true;
        for( int r = 0; r < grid.length-1; r++ )
        {
            if( !(grid[r][c] <= grid[r+1][c]) )
                g = false;
        }
        if( g ) cnt++;
    }
    return cnt;
}
```

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Question 4
part B

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