

AP COMPUTER SCIENCE A – QUIZ 5 STUDY GUIDE

Problems **1**, **2**, **5** and **6** make use of the class `Letters` listed here:

```
public class Letters {
    /**/
    private char [] letters;
    /**/
    public Letters () {
        init();
    }
    /**/
    public int getNumLetters () {
        return letters.length;
    }
    /**/
    public char getChar ( int index ) {
        return letters[index];
    }
    /**/
    public int getIndex ( char c ) {
        /**/
        for ( int i=0; i<letters.length; ++i ) {
            if ( c == letters[i] ) return i;
        }
        return -1;
    }
    /**/
    public void init () {
        /**/
        letters=new char [] {
            'a' , 'b' , 'c' , 'd' , 'e' , 'f' , 'g' , 'h' , 'i' , 'j' , 'k' , 'l' , 'm' ,
            'n' , 'o' , 'p' , 'q' , 'r' , 's' , 't' , 'u' , 'v' , 'w' , 'x' , 'y' , 'z'
        };
        /**/
        return;
    }
}
```

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- 1) What is the output of the program Cipher if it is invoked via
 java Cipher "spongebob loves gary" 1 17?

```

public class Cipher {
    /**/
    private static final int ENCRYPT = 1 , DECRYPT = 2;
    /**/
    private int option, offset;
    private Letters letters;
    private String inS;
    /**/
    public static void main ( String [] arg ) {
        /**/
        int option, offset;
        Cipher c;
        String input, output;
        /**/
        input=arg[0];
        option=Integer.parseInt(arg[1]);
        offset=Integer.parseInt(arg[2]);
        c=new Cipher(input,option,offset);
        output=c.modify();
        System.out.println(output);
        /**/
        return;
    }
    /**/
    public Cipher ( String s, int option, int offset ) {
        /**/
        inS=s;
        this.option=option;
        this.offset=offset;
        letters=new Letters();
    }
    /**/
    public String modify () {
        /**/
        int len;
        char cIn, cOut;
        String rv;
        /**/
        rv="";
        len=inS.length();
        for ( int i=0; i<len; ++i ) {
            cIn=inS.charAt(i);
            if ( cIn == ' ' ) cOut=' ';
            else if ( option == ENCRYPT ) cOut=encrypt(cIn);
            else cOut=decrypt(cIn);
            rv += cOut;
        }
        /**/
        return rv;
    }
    /**/
    private char encrypt ( char c ) {
        /**/
        int numLetters, inIndex, outIndex;
        /**/
        numLetters=letters.getNumLetters();
        inIndex=letters.getIndex(c);
        outIndex=inIndex+offset;
        while ( outIndex >= numLetters ) outIndex -= numLetters;
    }
}

```

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```

    return letters.getChar(outIndex);
}
/**/
private char decrypt ( char c ) {
    /*
     * implementation not shown
     */
}
}

```

Ans.

jgflexvsfs cfmvj xrip

- 2) Write a method for class Cipher which will perform the decryption if it is invoked via**
 java Cipher "jgflexvsfs cfmvj xrip" 2 17.

Ans.

```

private char decrypt ( char c ) {
    /**/
    int numLetters, inIndex, outIndex;
    /**/
    numLetters=letters.getNumLetters();
    inIndex=letters.getIndex(c);
    outIndex=inIndex-offset;
    while ( outIndex < 0 ) outIndex += numLetters;
    return letters.getChar(outIndex);
}

```

- 3) Describe the output of program RandomStuff if it is invoked via** java RandomStuff DrHarren 26.

```

import java.util.Random;
/**/
public class RandomStuff {
    /**/
    private int [] list;
    /**/
    public static void main ( String [] arg ) {
        /**/
        int len;
        int [] ia;
        RandomStuff rs;
        String password;
        /**/
        password=arg[0];
        len=Integer.parseInt(arg[1]);
        rs=new RandomStuff(password,len);
        ia=rs.getList();
        for ( int i=0; i<ia.length; ++i ) System.out.println(ia[i]);
        /**/
        return;
    }
    /**/
    public RandomStuff ( String password, int len ) {
        /**/
        init(password,len);
    }
    /**/
    public int [] getList () {
        return list;
    }
}

```

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```

/**/
private void init ( String password, int len ) {
    /**/
    int ri;
    long seed;
    Random r;
    /**/
    seed=(long)password.hashCode();
    r=new Random(seed);
    list=new int [26];
    for ( int i=0; i<26; ++i ) list[i]=26;
    for ( int i=0; i<26; ++i ) {
        while ( true ) {
            ri=r.nextInt(26);
            if ( !contains(ri) ) {
                list[i]=ri;
                break;
            }
        }
    }
    /**/
    return;
}
/**/
private boolean contains ( int n ) {
    /**/
    for ( int i=0; i<26; ++i ) {
        if ( list[i] == n ) return true;
    }
    return false;
}
}

```

Ans.

It outputs a list of all the numbers between 0 and 25 (inclusive) in random order.

4) Describe the output of program RandomStuff if it is invoked via `java RandomStuff nerraHrD 26`.

Ans.

It outputs a list of all the numbers between 0 and 25 (inclusive) in random order, but in a different order than in problem 3.

5) What is the output of program MoreCipher if it is invoked via
`java MoreCipher "spongebob loves gary" 1?`

```

public class MoreCipher {
    /**/
    private static final int ENCRYPT = 1, DECRYPT = 2;
    /**/
    private int [] values;
    private Letters letters;
    /**/
    public static void main ( String [] arg ) {
        /**/
        int option;
        MoreCipher mc;
        String input, output;
        /**/
        input=arg[0];
        option=Integer.parseInt(arg[1]);
    }
}

```

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```

    mc=new MoreCipher();
    output=mc.modify(input,option);
    System.out.println(output);
    /**/
    return;
}
/**/
public MoreCipher () {
    /**/
    init();
}
/**/
public String modify ( String s, int option ) {
    /**/
    int len;
    char cIn, cOut;
    String rv;
    /**/
    rv="";
    len=s.length();
    for ( int i=0; i<len; ++i ) {
        cIn=s.charAt(i);
        if ( cIn == ' ' ) cOut=' ';
        else if ( option == ENCRYPT ) cOut=encrypt(cIn);
        else cOut=decrypt(cIn);
        rv += cOut;
    }
    /**/
    return rv;
}
/**/
private char encrypt ( char c ) {
    /**/
    int inIndex, outIndex;
    /**/
    inIndex=letters.getIndex(c);
    outIndex=values[inIndex];
    return letters.getChar(outIndex);
}
/**/
private char decrypt ( char c ) {
    /*
     * implementation not shown
     */
}
/**/
private int getIndex ( int o ) {
    /**/
    for ( int i=0; i<26; ++i ) {
        if ( values[i] == o ) return i;
    }
    return -1;
}
/**/
private void init () {
    /**/
    values = new int [] {
        9 , 23 , 15 , 25 , 20 , 12 , 10 , 1 , 19 , 14 , 24 , 13 , 18 ,
        6 , 11 , 22 , 16 , 3 , 4 , 2 , 8 , 0 , 7 , 17 , 5 , 21 ,
    };
    letters=new Letters();
    /**/
    return;
}

```

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```
}  
}
```

Ans.

ewlgkuxlx nlaue kjdf

- 6)** Write a method for class `MoreCipher` which will perform the decryption if it is invoked via
`java MoreCipher "ewlgkuxlx nlaue kjdf" 2`

Ans.

```
private char decrypt ( char c ) {  
    /**/  
    int inIndex, outIndex;  
    /**/  
    inIndex=letters.getIndex(c);  
    outIndex=getIndex(inIndex);  
    return letters.getChar(outIndex);  
}
```