This is a 60 minute, CLOSED notes, books, etc. exam. 
ASK if anything is not clear. 
**WORK INDIVIDUALLY. CHEATERS WILL BE REALLY SORRY.**

**Strategy:** Scan the entire exam first. Work on the easier ones before the harder ones. 
Don’t waste too much time on any one problem. Provide enough information to show how you got your answers. Show all work on the space provided. 
Write your name on each page. Check to make sure you have 6 pages.

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1. **Bits and Bytes (10 points)**

   (a) **(5 points)** How many bits are there in a byte?

   (b) **(5 points)** How many different unique values can you represent with a byte?

2. **For loops 1 (10 points)**

   How many times will the method `doSomething()` be executed?

   ```java
   for( i = -5; i < 5; i +=2 )
       doSomething();
   ```

3. **For loops 2 (10 points)**

   What is the output of the following program segment?

   ```java
   incr = 200;
   for( i = 5; i <= 10; i += incr )
   {
       incr = -i;
       System.out.println( "incr is " + incr );
       System.out.println( "i is " + i );
   }
   ```
4. Sort 3 numbers (20 points)

The following program segment is suppose to sort three numbers and print them in decreasing order.

(a) (10 points) Assume that side1, side2, and side3 have the following values respectively: 33, 15, 27. What's the output of the following code segment?

(b) (10 points) Fix the code segment so that it produces the intended results.

```java
int side1, side2, side3;
boolean vs12, vs13, vs21, vs23, vs31, vs32;

vs12 = (side1 > side2);
vs13 = (side1 > side3);
vs21 = (side2 > side1);
vs23 = (side2 > side3);
vs31 = (side3 > side1);
vs32 = (side3 > side2);

if (vs12 && vs13)
    if (vs23)
        System.out.println( side1 + side2 + side3 );
    else System.out.println( side1 + side3 + side2 );
else if (vs21 && vs23)
    if (vs13)
        System.out.println( side2 + side1 + side3 );
    else System.out.println( side2 + side3 + side1 );
else if (vs12)
    System.out.println( side3 + side1 + side2 );
else System.out.println( side3 + side2 + side1 );
```
5. **Switch (20 points)**

(a) **(10 points)** Explain why Davis would more likely be recalled using the following code. Describe in 1 brief sentence, or fix the code below.

```java
import tio.*;
class Switch{
    public static void main(String[] args){
        int vote;
        int Recall=0,
            Davis=0,
            McClintock=0,
            Bustamante=0,
            Terminator=0,
            Others=0;

        vote = Console.in.readInt();

        switch ( vote ) {
            case 4: // No on Recall
                Davis++;
            case 3: // Yes on Recall
                Recall++;
                vote = Console.in.readInt();
                switch( vote ) {
                    case 19: McClintock++;
                    case 51: Bustamante++;
                    case 58: Terminator++;
                        break;
                    default: Others++;
                }
                break;
            default : System.out.println("Hanging chad");
        }
    }
}
```

(b) **(10 points)** Explain why the Terminator would more likely win using the following code. Describe in 1 brief sentence, or fix the code below.
6. **Syntax errors (10 points)**

   Fix all the syntax errors in the following program.

   ```java
   class Syntax Errors{
       public static void main(string[] args)
           int i;

           for( i=0, i<10, i++ )
               System.out.println( j );
   }
   }
   ```

7. **What's the output? (10 points)**

   (a) **(5 points)** If the user entered `hello`, what is the output of the program?

   (b) **(5 points)** In general, what does this program do? Describe in 1 brief sentence.

   ```java
   import tio.*;

   class Something{
       public static void main(String[] args){
           int i, len;
           char ch;
           String original, changed;

           System.out.println( "Enter string: " );
           original = Console.in.readLine();

           changed = "";
           for (i=0; i<original.length(); i++ ) {
               ch = original.charAt(i);
               changed = ch + changed;
           }
           System.out.println( "Something is: " + changed );
       }
   }
   ```
8. **Complete the Code (10 points)**

Complete the program below so that it encrypts strings using the table below:

```
  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
  d  e  f  g  h  i  j  k  l  m  n  o  p  q  r  s  t  u  v  w  x  y  z  a  b  c
```

That is, letters are cyclically shifted over by 3. If an input string contains *alex* the corresponding encrypted string will be *doha*. If the string contains characters other than lower case letters, they are returned as is. **You cannot use if or switch statements; answer must fit in the space provided.**

Complete the following program:

```java
import tio.*;

class Encrypt {
    public static void main(String[] args) {
        String original, // input string
             encrypted; // encrypted string
        int i, // loop variable
             tmpint; // int variable in case you need one
        char ch, // character being processed
                 tmpchar; // char variable in case you need one

        System.out.print( "Enter string to be encrypted: ");
        original = Console.in.readLine();
        encrypted = "";

        for( i=0; i<original.length(); i++ )
        {
            // process 1 character at a time
            ch = original.charAt(i);
            if (ch >= 'a' && ch <= 'z') {

            } // add character to encrypted string
            encrypted += ch;
        }

        System.out.println( "Encrypted string is " +
                            encrypted );
    }
}
```