Name_____

Test 1 Make-up
(250pts)

A. Tracing Code (60pts)

Write what output will appear in the box provided. If there is screen output and file output, be sure to place output for each in their correct boxes. Also, make sure you keep track of your variable states as you trace through the code. There are boxes provided for these also, please us them. It will be best to cross out old values as you update them rather than delete them as this will help you maintain a version history in case you need to retrace your steps.

1. (5pts)

```
public class Trace1{
  public static void main(String [] args){
    System.out.print("ha \n ha");
    System.out.println(" ha!");
    System.out.println("\t\thappy\\n");
  }
}
```

output

2. (5pts)

```
public class Trace2{
  public static void main(String [] args){
    int x = 32;
    int y = 55;
    int z = 0;
    int i = -1;
    boolean is = false;

    if(x > y || z > i){
      if(i > 0){
        System.out.print("a");
      } else if (i == -1){
        System.out.print("p");
        if(!is){
          System.out.print("i");
        } else {
          System.out.print("p");
        }
        if(true){
         System.out.println(“p”);
        }
      } else{
        System.out.println("d");
        if(x == 32 && y == 55 && z == 0){
          System.out.print("You made it!");
        } else {
          System.out.print("Next time...");
        }
      }
    } else {
      System.out.print("x is less than y");
    }
  }
}
```

output

3. (5pts)

output

```
public class Trace3{
  public static void main(String [] args){
    int s = 4;
    int t = 3;
    int u = 13;
    int v = 6;

    System.out.println(Math.pow(s,t) + 7.0f * (u / v * 2));
  }
}
```

4. (5pts)

```
public class Trace4{
  public static void main(String [] args){
    for(int i = 5; i > 1; i--){
      for(int j = 1; j < i; j++){
       //unicode for smiley face \u263A
        System.out.print("\u263A" + "\u263A" + " ");
      }
        System.out.print("\n");
    }
  }
}
```

i

j

output

5. (5pts)

```
public class Trace5 {
  public static void main(String [] args){
    String test = "";
    int n = 3;

    if(true && true && true && true && false){
      test += "Do you ";
    } else {
      test += "understand ";
    }

    if(n == 1 + 1 + 1){
      test += "the risks ";
      n--;
    }

    for(int i = 0; i < n; i++){
      test += "you should \n";
    }

    System.out.println(test);
  }
}
```

n

i

test

output

6. (5pts)

```
public class Trace6{
  public static void main (String [] args){
    int upper = 1;
    int lower = 0;

    int r = (int) (Math.random() * (upper - lower)) + lower;

    System.out.println(r);
  }
}
```

output

7. (5pts)

```
public class Trace7{
  public static void main(String [] args){
    String tape = "aabbabaab";
    String res = "";

    for(int i = 0; i < tape.length(); i++){
      char c = tape.charAt(i); //get character at position i

      if(c == 'a'){
        res += 'b';
      }

      if(c == 'b'){
        res += 'a';
      }
    }

    System.out.println(res);
  }
}
```

output

result

i

c

8. (5pts)

```
public class Trace8 {
  public static void main(String [] args){
    String a = "42";
    String b = "banana";

    int letter = 65;

    char c = 65;      //character A
    char d = (char) (letter + 1);
    char e = (char) (letter + 2);
    int x = 16;
    int y = 9;

    System.out.println(a + b);
    System.out.println(x + y);
    System.out.println(a + y);
    System.out.println(c + " " +  d + " " +  e);
  }
}
```

output

9. (5pts) The user enters: n, o, and t as input (one letter each time)

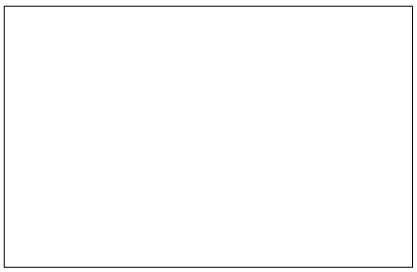
```
import java.util.Scanner;

public class Trace9 {
  public static void main(String [] args){
    Scanner s = new Scanner(System.in);

    String secret = "Melts in your mouth not in your hand";
    String mask = "x";

    System.out.println("Welcome to censor.exe");
    String input = s.nextLine();

    do{
      secret = secret.replace(input.charAt(0), 'x');
      System.out.println(secret);
      System.out.println("");
      input = s.nextLine();
    } while(!input.equals("done").trim().toLowerCase());

    System.out.println("Thanks for censoring content!");
    System.out.println("Here is your final censored document:" );
    System.out.println("");
    System.out.println(secret);

  }
}
```

output

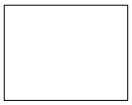
10. (5pts)

```
public class Trace10{
  public static void main(String [] args){

    String five =   "xxxxx";
    String three =   "xxx";
    String res = "";

    for(int i = 0; i < five.length(); i++){
      for(int j = 0; j < three.length(); j++){
        res += "x";
      }
    }

    System.out.println(res.length());
  }
}
```

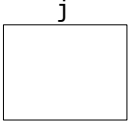
output



i



j



B. Debugging Code (28pts)
Rewrite the code below so that it is correct and will compile.

1.
```
string integer = “int”;
int string = 1920189147;
char s = 83; //ASCII number for the letter ‘S’
System.out.println(s + int + string);
```

2.
```
for(int i = 0; i < 3; i++){ i
        for(int j = 0; j < 2; j+){
                System.out.print(“j”);
        }
         System.out.print(“\n”);
}
```

3.
```
if(int i = 0; i < 10; i++){
        System.out.print(‘alleluiah’);
}
```

4.
```
while(){
        i++;
}
```

5.
```
Scanner s = new Scanner(System.out);
int x  = s.nextInt;
```

6.
```
char t = ‘today is monday’;
Sys.out.prnt(t);
```

7.
```
System.out.println(3.0f * 2f / 3^3);
System.out.println(Math.pow());
```

C. Concepts (56pts)

1. After you are finished writing the source code for a computer program, list the steps that you must take in order for the program to execute.

2. What is the difference between =, ==, and .equals() in Java?

3. What is the difference between a literal such as 32 or “Hello World!” and a variable such as int x?

4. What is the difference between arithmetic operators such as +, -, *, / and the logical and relational operators such as ||, !, >, <, and && ?

5. What are curly braces { } used for in Java?

6. What is the difference between System.in and System.out? Why do they both start with the identifier System?

7. What is the difference between byte, short, long, and int types?

8. What does the final keyword do in Java?

9. Math.abs(x) and System.out.println(x) both take x as a parameter and produce output. These are both examples of function calls. Math.pow(x, y) and x + y are also both function calls. Even though + invokes a function, it is written in a special way. + is called an operator. Operators are special functions that use infix notation for their parameters. Give an example of two other operators and describe what their inputs and outputs are. Please use specific examples to illustrate what you mean.

10. Describe what the following code does:

```
import java.util.Scanner;
import java.io.File;
import java.io.IOException;

public class Homoiconic {
   public static void main(String [] args) throws IOException{
       Scanner fileIn = new Scanner(new File("Homoiconic.java"));

       while(fileIn.hasNext()){
              System.out.println(fileIn.nextLine());
       }
   }
}
```

12. Why do number variables have minimum and maximum values in Java?

13. What is the difference between a primitive variable type like int or char and an object variable like Scanner or String?

14. Do you foresee programming being a large part of your career in 5 years? How will you be using it?

D. Writing Programs (120pts)

1. Write a computer program that counts by 4's. The program should print out every number between 1 and 100 that is a multiple of 4. You should use a loop so that your program could later be altered to count by fours past 100.

The output for the program should look like this:
4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100

2. Write a program that randomly generates a 1 or a 0.

3. Write a program that shifts all of the letters in a String by 4 values in the ASCII/Unicode table. For instance, if the String provided as input is “ABCD” the output of the program should be “EFGH”

4. Write a program that calculates and prints out the sum of all the odd numbers between 1 and 200

5. Write a program that prints out the following output using a nested for loop:

```
x x x x
 x x x
x x x x
 x x x
x x x x
```

6. Write a program that asks a user how much they weigh and how tall they are. If the person is over 6ft and less than 150lbs. Have the program say “My how tall and skinny you are!” If the person is under 5ft and over 400lbs, have the program say “My how short and fat you are!” If the person is over 6ft and more than 500lbs, have the program say, “My how tall and fat you are!” If the person is under 5ft and less than 100lbs, have the program say, “My how short and skinny you are!” For any other weight and height, have the program remark, “You are very average! YAWN!”

7. Write a program that keeps asking the user for money until they enter the amount 3.50 at which point the program will thank the user, print out the total amount of money given, and exit.

8. Write a program that takes a number of inches as input and converts the number into feet and inches. For instance, if the user enters the number 49, the program will report that 50 inches is 4ft and 2 inches (There are 12 inches in 1 foot.)

9. Write a program that asks the user for a sentence and then prints out the sentence backwards. So for instance. The user may type in: “Who watches the watchmen?” and the program will print out: “? nemhctaw eht sehctaw ohW” Remember the library function charAt() which will return a character at a particular position in a String.

10. Write a program that reads the contents of the file elon-musk.csv.

Assignment (54pts)
Write a program that asks a user for 5 different letters and a String size. After the 5 letters and String size are taken as input from the user, the program should generate a String of random characters using only the 5 characters provided by the user. The String should be the length specified by the user.

So for instance, if the user specifies that their characters should be l, m, n, o, and p and that their string should be of length 10. The program should randomly output something like this:

moopnlnlom

where each character was randomly chosen. After the program outputs the random String, the program should ask the user if they would like another String. If the user types yes or y (ignoring whitespace and capitalization), another random String should be produced (using the same set of characters) and the program should ask again if they would like another String. This should continue until the user types ‘done’ or ‘exit’, the program should understand the request to leave regardless of whitespace and capitalization.