Midterm Exam I

Instructor: Yu Wang

2/25/2012

Name: ___________________________

Emory ID: _________________________

Alias: ____________________________
INSTRUCTIONS:

- Keep your eyes on your own paper and do your best to prevent anyone else from seeing your work.
- Do NOT communicate with anyone other than the professor/proctor for ANY reason in ANY language in ANY manner.
- This exam is closed note, closed books, and no calculator.
- Turn all mobile devices off and put them away now. You cannot have them on your desk.
- Write neatly and clearly indicate your answers. What I cannot read, I will assume to be incorrect.
- Stop writing when told to do so at the end of the exam. I will take 5 points off your exam if I have to tell you multiples times.
- Academic misconduct will not be tolerated. Suspected academic misconduct will be immediately referred to the Emory Honor Council. Penalties for misconduct will be a zero on this exam, and F grade in the course, and/or other disciplinary action that may be applied by the Emory Honor Council.

TIME: This exam has 4 questions. Please check to make sure no page is missing. You will have 50 minutes to complete this exam.

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I commit to uphold the ideals of honor and integrity by refusing to betray the trust bestowed upon me as a member of the Emory community. I have also read and understand the requirements and policies outlined above.

Signature:_______________________________

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<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points:</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Score:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. (25 pts) Write down the appropriate answers:

(a) (2 pts each) State whether the statement is correct or has an error. The first row has been completed for you.

```c
int a = 1, b = 2;
```

<table>
<thead>
<tr>
<th>Statement</th>
<th>Error?</th>
</tr>
</thead>
<tbody>
<tr>
<td>int c = a / b;</td>
<td>No</td>
</tr>
<tr>
<td>double d = a = a / b;</td>
<td>No</td>
</tr>
<tr>
<td>String s = (char) a;</td>
<td>Yes</td>
</tr>
<tr>
<td>String s = a + b;</td>
<td>Yes</td>
</tr>
<tr>
<td>char c = (char)(double) a + b;</td>
<td>Yes</td>
</tr>
<tr>
<td>int c = ‘2’ + a;</td>
<td>No</td>
</tr>
</tbody>
</table>

(b) (3 pts each) For each row of the table, state whether the expression is correct or has an error. If there is no error, give the type and result of the expression. If there is error, leave the type and result as blank. The first row has been completed for you.

```c
int a = (int)'A';
double b = (int)'b' - 'a';
String s = "3456";
int d = 1, e = 2;
```

<table>
<thead>
<tr>
<th>Expression</th>
<th>Error?</th>
<th>Type(If no error)</th>
<th>Result (if no error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>d + e</td>
<td>No</td>
<td>int</td>
<td>3</td>
</tr>
<tr>
<td>e - d + s</td>
<td>No</td>
<td>String</td>
<td>“13456”</td>
</tr>
<tr>
<td>(char)s.charAt(2) + e</td>
<td>No</td>
<td>char</td>
<td>‘7’</td>
</tr>
<tr>
<td>(int)s + e + d</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a = a + b</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b + e / (e + 1)</td>
<td>No</td>
<td>double</td>
<td>1.0</td>
</tr>
</tbody>
</table>
2. (25 pts) Read the following programs, and write the output:

```java
int a = 10;
int b = 12;
System.out.println(b % a * a % b);
```

Output: 8

```java
char a = 'B', b = 'b';
int c = 'A';
if(b - a == 'A' - 'a' && a - c >= 0 && a - c <= 26) {
    System.out.println(a - c + "");
}
boolean d = a % c == 1;
System.out.println(d);
```

Output: true

```java
int a = 10;
while(a > 0) {
    if(a % 2 > 0)
        a = a - a % 2;
    else
        a = a - 3;
}
System.out.println(a);
```

Output: -1

```java
String s = "hello";
for(int i = s.length() / 2; i < s.length(); i++) {
    System.out.print(s.charAt(i));
    System.out.print(s.charAt(s.length() - i));
}
```

Output: llllooe

```java
String s = "world";
String k = "";
for(int i = 0; i < s.length(); i++) {
    k = s.charAt(i) + k + s.charAt(i);
}
System.out.println(k);
```

Output: dlrowworld
3. (25 pts) Write a Java program named “perfect.java” to test if the input number is a perfect number. The program should use Scanner to read the number. Print out “Yes” if it’s a perfect number. Otherwise, print out “No”.

Definition: a number is a perfect number if and only if it is equal to half the sum of all its positive divisors.

For example, 6 is a perfect number because 6 has divisors: 1, 2, 3 and 6, where $6 = (1 + 2 + 3 + 6) / 2$. The next perfect number is 28.

```java
import java.util.Scanner;

public class perfect {
    public void main(String[] args) {
        Scanner in = new Scanner(System.in);
        int num = in.nextInt();
        // complete the program by testing
        // if num is a perfect number

        int sum = 0;
        for (int i = 1; i <= num; i++) {
            if (num % i == 0) {
                sum += num;
            }
        }

        if (sum / 2 == num)
            System.out.println("Yes");
        else
            System.out.println("No");
    }
}
```
4. (25 pts) Fill in the blanks in the following program “digitSum.java” and make it complete.

Description of the program: read a positive number from terminal (using Scanner), print out the sum of all digits in that number. For example, if the number is 125, your program should print out 8, which is 1 + 2 + 5.

Program digitSum.java

```java
import java.util.Scanner;

public class digitSum {
    public void main(String[] args) {
        Scanner in = new Scanner(System.in);
        int m = in.nextInt(); // read the number from terminal
        int sum = 0;
        while (m > 0) // stop when m has no digit left
            { // increase the sum with last digit of m
                sum = sum + m % 10;
            // update m by removing its last digit
                m = m / 10;
        }
        System.out.println(sum);
    }
}
```