CS 305j
Fall 2010
Midterm 1
October 6, 2010

Name:
EID:
Tues discussion time:
Circle your discussion section TA: Christian Oliver

- Answer all questions. Please give clear answers. If you give more than one answer, we will randomly choose one to grade, so please clearly mark out any answer you do not want us to grade.

- If you are asked for code, write Java code.

- The proctors will not answer questions about the course material.

- Put away all electronics - calculators, mp3 players (and earbuds), etc.

- Silence your cell phone and put it away.

- Use extra paper (attached) to determine your answers and copy them neatly on these sheets.

- Your answer must be legible to receive credit.

- Make sure you clearly write your name, EID, lecture and discussion times, and TA on this page.

**GOOD LUCK**

<table>
<thead>
<tr>
<th>Question</th>
<th>Points Lost</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>24 (4 each)</td>
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<td>17</td>
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<tr>
<td>Total</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>
1. (Expressions/Method Calls). For each part, write the value of the expression. Be sure to list a constant of the appropriate type (e.g., put a String in double quotes, a char in single quotes, 4.0 rather than 4 for a double, etc).

(a) `'ElvisPresley'`.indexOf(`'s'`);

4

(b) `'1'` + 2 + 3 * 4 + (5 + 1)

"12126"

(c) 5 % 12 * 3 / 2

7

(d) ('h' != 'H') && (1 == 1)

true

(e) 345 / 10 / 3 + 10 / 4

13

(f) 1.5 + 5 / 2 + 1.5

5.0
2. (Parameters). Consider the following program. List the output produced by this program when it is run.

```java
public class ParameterStuff {
    public static void main(String[] args) {
        int x = 2;
        int y = 5;
        System.out.println(one(x, 10, y));
        two(x, y);
        System.out.println(x + " " + y);
        int a = 3;
        int b = 2;
        two(b, a);
        System.out.println(a + " " + b);
        x = 3;
        y = four(x, x);
        System.out.println(y);
    }

    public static int one(int a, int b, int c) {
        return Math.max(a, Math.max(b, c));
    }

    public static void two(int a, int b) {
        a++;
        b--;
        System.out.println(a + " " + b);
    }

    public static int three(int a) {
        int x = a * 2;
        return x;
    }

    public static int four(int a, int b) {
        a = a / 2;
        b = three(a) + three(b);
        System.out.println(a + " " + b);
        return a;
    }
}
```

```
10
3 4
2 5
3 2
3 2
1 8
1
```
3. (Loop Trace). Consider the following static method.

```java
public static int foo(int x, int y) {
    for (int i = 1; i < y; i++)
        x -= y;
    return x;
}
```

For each method call below, what value is returned?

<table>
<thead>
<tr>
<th>Method Call</th>
<th>Value Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>foo(-1, 1)</td>
<td>-1</td>
</tr>
<tr>
<td>foo(3, 5)</td>
<td>-17</td>
</tr>
<tr>
<td>foo(-3, 2)</td>
<td>-5</td>
</tr>
</tbody>
</table>
4. (Nested Loops Trace). What is the output produced by the following program?

public class Mystery{

    public static void main(String[] args) {
        System.out.println(loopIt(3));
        System.out.println(loopIt(5));
        System.out.println(loopIt(0));
    }

    public static int loopIt(int n) {
        int x = 0;
        for(int i = 1; i <= n; i++) {
            for(int j = 1; j <= i; j++) {
                x += j;
            }
        }
        return x;
    }

}  

Output:
10
35
0
5. (Programming). Write a method named `sumTo` that takes an integer parameter `n` and returns the sum $1 + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{n}$.

For example, `sumTo(2)` should return the value $1.5 \ (1 + \frac{1}{2})$. If `sumTo` is passed the value 0, it should return 0.0 as its result. You may assume that `sumTo` is never passed a negative value.

```java
public static double sumTo(int n) {
    double sum = 0;
    for(int i = 1; i <= n; i++) {
        sum += 1.0/i;
    }
    return sum;
}
```
6. (Programming). Write a method named `digitSum` that takes a non-negative integer as its parameter and then returns the sum of its digits. For example, `digitSum(20879)` should return `26` (2 + 0 + 8 + 7 + 9). You may assume that the method is passed a value greater than or equal to 0. You may not use a `String` to solve this problem; you must solve it using integer arithmetic.

```java
public static int sumDigits(int n){
    int sum = 0;
    String s = ""+n;
    int len = s.length();

    for(int i = 0; i < len; i++) {
        sum += n%10;
        n = n/10;
    }
    return sum;
}
```