CS 101 Spring 2007 Midterm 2 Name: _____ Email ID: _____

You only need to write your name and e-mail ID on the first page.

This exam is CLOSED text book, closed-notes, closed-calculator, closed-neighbor, etc. Questions are worth different amounts, so be sure to look over all the questions and plan your time accordingly. Please sign the honor pledge here:

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Note: When an integer type is required use `int`*, when a floating-point type is required use* `double`*. If we don't specify an aspect of the problem, you can choose it.*

Note: If you are still writing on the exam after "pens down" is called – even if it is just to write your name – then you will receive a zero on this exam. No exceptions!

1. [3 points] What lab section are you in?

____ CS 101-E

____ CS 101-2 (lab 8:00–9:15 a.m. Thu)

____ CS 101-3 (lab 9:30–10:45 a.m. Thu)

____ CS 101-4 (lab 11:00–12:15 p.m. Thu)

____ CS 101-5 (lab 12:30–1:45 p.m. Thu)

____ CS 101-6 (lab 2:00–3:15 p.m. Thu)

____ CS 101-7 (lab 3:30–4:45 p.m. Thu)

____ CS 101-8 (lab 5:00–6:15 p.m. Thu)

____ CS 101-9 (lab 6:30–7:45 p.m. Thu)

2. [4 points] In about 20 words or less, explain how classes and objects differ.

3. [6 points] In about 20 words or less, explain what the halting problem is

4. [6 points] In about 20 words or less, explain why the halting problem is so important.

5. [4 points] In about 20 words or less, explain why we need to use the `.equals()` method when comparing `String` objects.

6. [4 points] In about 20 words or less, explain the difference between a `while` loop and a `do-while` loop

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7. [9 points] Answer the following questions based on the following code:

```
public static void main(String [] args) {
     Scanner stdin = new Scanner(System.in);
     System.out.println (“Please enter the number “ +
                          “ of textbooks you read.”);
     int books = stdin.nextInt();
     int browniePoints = 10;

     if (books < 1) {
          browniePoints -= 1;
     }
     if (books < 3) {
          browniePoints -= 3;
     }
     if (books < 5) {
          browniePoints -= 5;
     }
     else {
          browniePoints += 10;
     }

     System.out.println(“Based on your input you have: ”
          + browniePoints + “ brownie points.”);
}
```

a. What is printed if the user enters: 3?

Based on your input you have: _____ brownie points.

b. What is printed if the user enters: 0?

Based on your input you have: _____ brownie points.

c. What is printed if the user enters: 7?

Based on your input you have: _____ brownie points.

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8. [6 points] Given the following code, write an equivalent nested if statement. Assume that `amount1`, `amount2`, and `max` are all `ints` which are previously declared and initialized.

```
if( amount1 > 5 && amount2 < 10) {
   max = (amount1 > amount2) ? amount1 : amount2;
   System.out.println ("The maximum is: " + max);
}
```

9. [5 points] Write an statement using the `?:` notation that assigns 30 to the variable `y` if the variable `y` is greater than 10 (assume all variables are ints and have been properly declared and initialized).

10. [5 points] The following code to sum even numbers less than 100 has a bug. Find and explain the bug in about 20 words or less.

```
int sum = 0;
for(int number = 0; number < 100; number += 2) {
   sum += number;
   number++;
}
```


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11. [7 points] Write a `while` loop which displays the following numbers (they can be on separate lines, and don't need the commas):

```
0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50
```

12. [7 points] Convert the following `while` loop to a `for` loop:

```
i = 100;
while (i > 0) {
   System.out.println("i is : " + i);
   i--;
}
```

[7 points] Write a for loop that will go through a Vector object `v` (which has been properly declared and initialized already), and print out each String that is in the object. Remember that Vectors have a `.size()` method that will return the number of elements in the Vector.

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13. [8 points] Given the following method signatures, list the return type.

a. `public static void main(String [] args) {` return type: _____

b. `public double cos(int angle) {` return type: _____

c. `public Circle() {` return type: _____

d. `public static int max(int x, int y) {` return type: _____

e. `public String toString() {` return type: _____

14. [9 points] Consider the following code:

```
if ( i || j ) {
      if ( j && k ) {
            System.out.println("A”);
      }
      else if ( !k || i ) {
            System.out.println(“B”);
      }
      else {
            System.out.println(“C”);
      }
}
else if (!j && k ) {
      System.out.println(“D”);
}
else {
      if ( i || k ) {
            System.out.println(“E”);
      }
      else {
            System.out.println(“F”);
      }
}
```

a. What is printed if `i` is `true`, `j` is `false`, and `k` is `true`?

b. What is printed if `i, j,` and `k` are all `false`?

c. What values of `i, j,` and `k` are needed to print `D`?

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15. [10 points] When an object is falling due to gravity, the distance (in meters) it falls is calculated as one half the gravity multiplied by the square of the falling time (in seconds) – in other words, $d = \frac{1}{2} g * t^2$, where *d* is the distance fallen, *g* is gravity, and *t* is the time taken. You may assume that gravity is fixed at 9.8 m/s^2. Write a method called `distanceFallen` that accepts the object's falling time as a `double` and returns the distance fallen as a `double.`

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