

[**May use all sides of an 8.5 × 11 inch sheet of paper**] Show all of your work clearly in the space provided or on the additional page at the end of the exam. If the additional page is used, clearly identify to which exam question it is related. Be sure to **read each problem carefully**. Note that the exam is double sided. Due to time constraints, you are not required to document your source code.

1. (15 points) Precisely and concisely describe the differences between a `do/while` loop and a `while` loop.

2. (15 points) Based on the values for the variables below, circle all of the lines of code that will not be executed. All lines of code that would execute should not be circled.

```
int i = 3;
int j = 5;
boolean t = true;
boolean f = false;
```

```
if(i<j)
{
    j = j;
} else {
    i = i;
}
if(i>2 && t!=f)
{
    j = j;
} else {
    if(t==f)
    {
        i = i;
    }
    t = t;
}
```

3. (20 points) Write a class method called `wordCount` that accepts a `String` and returns the number of words found in the string that was passed to it. Hint: remember that the `Scanner` class has a constructor that accepts a `String`.

4. (30 points) Write a program to verify or disprove that

$$1^n + 5^n + 10^n + 18^n + 23^n + 27^n = 2^n + 3^n + 13^n + 15^n + 25^n + 26^n$$

for  $0 \leq n \leq 10$ . Be sure to include all that is necessary for the file to compile. Hint: `Math.pow(x, y)` returns  $x^y$  where  $x, y$ , and the result are all of type `double`.

5. (20 points) The following program makes use of a `HouseEstimate` class.

```
import java.util.*;

/**
 * @author Dr. Chris Taylor
 *
 * Makes use of the HomeEstimate class to estimate the
 * cost of building a house based on the user's desires.
 */
public class House {

    public static void main(String[] args) {
        Scanner userIn = new Scanner(System.in);
        HouseEstimate estimate = new HouseEstimate();

        System.out.println("Let me help you estimate the cost of building a house.");
        System.out.println("For your desired house:");
        System.out.print("Enter the total number of square feet: ");
        int sqFeet = userIn.nextInt();
        System.out.print("Enter the number of bathrooms: ");
        double numBaths = userIn.nextDouble();
        System.out.print("Enter the number of bedrooms: ");
        int numBeds = userIn.nextInt();
        System.out.print("Enter the number of fireplaces: ");
        int numFires = userIn.nextInt();
        double cost = estimate.cost(sqFeet, numBaths, numBeds, numFires);

        System.out.print("The cost of building this house is: $" + cost);
    }
}
```

Draw the UML class diagram for the `HouseEstimate.java` class. You should be able to infer all of the required methods for the class. Based on how the class is used in the above code, you should be able to guess at appropriate attributes.

Place answer on next page.



Answer to problem 5 goes here:



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Additional work area for any problem. Clearly identify to which problem the work on this page is related.