[**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. (10 points) Clearly describe the differences between a `do/while` loop and a `while` loop.

2. (20 points) The following program makes use of a HouseEstimate class.

```
import java.util.*;

/**
 * @author Dr. Chris Taylor
 * 10-27-2004
 *
 * 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);
  }
}
```

You should write the complete HouseEstimate.java class file except you should leave all of the method bodies empty. For example, if you had a method called stuff that accepted nothing and returned an integer, your solution would look like:

```
...
public int stuff() {
  // Not required
}
...
```

Place answer on next page.

Answer to problem 4 goes here:

3. (15 points) Assume i, j, and k are `int`s and x is a `double`. Rewrite the following code using `if` and/or `if/else` statements instead of the `switch` statement.

```
switch(i) {
  case 3:
    System.out.println("1 + 2 = " + i);
    break;
  case j:
  case k:
    System.out.println("i is " + k);
  default:
    System.out.println("Do you know what i is?");
}
```

4. (25 points) The probability that an individual telephone call will last less than t minutes can be approximated by the exponential probability function:

$$\text{probability that a call lasts less than } t \text{ minutes} = 1 - e^{-t/a}$$

where a is the average length of a call and $e = 2.71828$ (Euler's number). For example, assuming that the average call length is 2 minutes, the probability that a call lasts less than 1 minute is calculated as $1 - e^{-1/2} = 0.3297$.

Using this probability function, write a Java program that asks the user to enter the average length of a call and displays the probabilities of a call lasting less than 1 to less than 500 minutes, in 1 minute increments.

Hint: In the java.lang.Math class is a `static` method which "Returns Euler's number e raised to the power of a `double` value." The method accepts a `double` value and returns a `double`.

```
// imports here


public class Exam2Prob4 {
  public static void main(String[] args) {









  }
}
```

5. (30 points) Suppose three MSOE students are given a set of 45 programs to write. The team decides to draw straws to decide how many programs each team member will write. Each straw has a number on it. The number on each straw indicates the number of programs that the student who draws it is required to write. In addition, it indicates the number of comments the student must include in each program they write. For example, if a student draws a straw with the number 17 on it, they are required to write 17 programs with 17 comments in each program.

Write a program that displays all of the number combinations that will result in the correct number of programs being written. For example, 3, 17, and 25 is a valid combination whereas 3, 6, and 9 is not.

```
// imports here


public class Exam2Prob5 {
  public static void main(String[] args) {









  }
}
```

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

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