University of Maryland College Park

Dept of Computer Science
CMSC131 Fall 2017
Midterm I Key

Last Name (PRINT): ____

First Name (PRINT): ____

University Directory ID (e.g., umcpturtle) _______________________________________

I pledge on my honor that I have not given or received any unauthorized assistance on this examination.

Your signature: ____

Instructions

Grader Use Only

#1	Problem #1	(20)	
#2	Problem #2	(50)	
#3	Problem #3	(60)	
#4	Problem #4	(70)	
Total	Total	(200)	

Problem #1

Implement the method **sum** that has the prototype below. The method computes the sum of the parameter values only if the three values are different; otherwise it will return 0. For example, sum(2, 3, 1) will return 6, but sum(2, 2, 1), sum (3, 2, 3), and sum(3, 3, 3) will return 0.

```
public static int sum(int a, int b, int c) {
```

Answer:

```
public static int sum(int a, int b, int c) {
	if (a != b && a != c && b != c) {
		return a + b + c;
	}
	return 0;
}
```

Problem #2

Implement the method **harmonicNumber** that has the prototype below. The method computes the **n-th** harmonic number which is the sum of the reciprocals of the first **n** natural numbers.

HarmonicNumber(n) = 1 + 1/2 + 1/3 + 1/4+ … + 1/n

For example, HarmonicNumber(2) is 1.5

```
public static double harmonicNumber(int n){
```

Answer:

```
public static double harmonicNumber(int n) {
	double answer = 0;

	for (int i = 1; i <= n; i++) {
		answer += 1.0 / i;
	}

	return answer;
}
```

Problem #3

Implement the method **drawDiagram** that has the prototype below. The method will display a triangle where the height corresponds to size and the first * character in each row is preceded by an increasing number of spaces. The number of rows corresponds to the size parameter.

The following are examples of diagrams the method will generate:

```
For a size parameter of 2:
**
 *

For a size parameter of 3:
***
 **
  *

For a size parameter of 4:
****
 ***
  **
   *
```

Your solution must handle different size values (not just 2, 3, and 4).

```
public static void drawDiagram(int size) {
```

Answer:

```
       public static void drawDiagram(int size) {
              int spaces = 0;
              for (int row = 1; row <= size; row++) {
                     for (int col = 1; col <= spaces; col++) {
                            System.out.print(" ");
                     }
                     for (int col = spaces + 1; col <= size; col++) {
                            System.out.print("*");
                     }
                     System.out.println();
                     spaces++;
              }
       }
```

Problem #4

Complete the guess number program that appears on the next page. The program will read an integer value from the user and verify whether that value is the one the program selected (valueToGuess). The program will keep asking the user for a value as long as the user have not guessed the expected value (valueToGuess) and the number of allowed attempts (5) has not been exceeded. If the value entered by the user is the expected value, the program will print the message "You won" and end. If the value is larger than valueToGuess, the program will print "Too high" and "Too low" if smaller. To read a value print the message "Enter value: ". The following is an example of running the program you are expected to write (remember your program must work for other values). Underlined text represents input provided by the user.

Answer:

```
public class Guess {
      public static void main(String[] args) {
            Scanner scanner = new Scanner(System.in);
            Random random = new Random();
            int endOfRange = 10;

            /* Generates random value between 1 and maximum */
            int valueToGuess = random.nextInt(endOfRange) + 1;

            /* Students needed to provide code from this point on */
            int maxGuessesAllowed = 5;
            int attempts = 0;
            boolean done = false;
            do {
                  attempts++;
                  System.out.print("Enter value: ");
                  int guess = scanner.nextInt();
                  String message;
                  if (guess < valueToGuess) {
                        message = "Too Low";
                  } else if (guess > valueToGuess) {
                        message = "Too high";
                  } else {
                        message = "You won";
                        done = true;
                  }
                  System.out.println(message);
            } while(!done && attempts < maxGuessesAllowed);

            /* End of what students needed to provide */
            scanner.close();
      }

}
```