

COP 3330 Exam #1 9/21/2026

Please print your name in CAPITAL letters.

Last Name: _____, First Name: _____

1) (10 pts) Complete the program below so that the user enters the total distance of a road trip (in miles), the average speed (in miles per hour) when driving during the road trip and the number of minutes during the trip where the car was stopped (for rest or refueling) and prints out the total time, in hours, that the trip will take. **Each value entered by the user will be an integer. In order to earn full credit, you must store each value entered by the user in an integer variable. You may declare any other variables of any type as you need.**

```
public static void main(String[] args) {  
  
    double res = 0.0;  
    Scanner stdin = new Scanner(System.in);  
    System.out.println("How long was the trip in miles?");  
  
    _____ ;  
    System.out.println("What was the average speed in mph for the trip?");  
  
    _____ ;  
    System.out.println("How many minutes did you stop during the trip?");  
  
    _____ ;  
  
  
  
  
  
  
    System.out.println("Your trip took "+ res +" hours.");  
}
```

2) (8 pts) Write a segment of code that creates one Random object and prints out 100 randomly generated integers, in increasing order such that each subsequent integer is in between 1 and 100 more than the previous randomly generated integer, with each of these 100 choices being equally likely. (For example, if we've already generated 27, 50, 126, then the fourth integer must be in between 127 and 226, inclusive, with each choice equally likely.) The first integer should be in between 0 and 99, inclusive. **(Note: Do NOT use Math.random().)**

3) (8 pts) Complete the method below that takes in a String str and a char ch and prints out each index location in str that ch occurs. Please solve this task by only using the String method .charAt:

```
public static void printLocs(String str, char ch) {
```

```
}
```

4) (8 pts) Now, solve the same problem given in question 3 but this time without using the charAt method and instead using both versions of the indexOf method listed at the end of the exam.

```
public static void printLocs(String str, char ch) {
```

```
}
```

5) (15 pts) Here is a layered square with three layers:

```
3 3 3 3 3
3 2 2 2 3
3 2 1 2 3
3 2 2 2 3
3 3 3 3 3
```

Complete the main method below, using a nested loop structure, so that it prints out a layered square of size n, where n is guaranteed to be a positive integer in between 1 and 9, inclusive. **All of your print statements can print out at most two characters. Note: Think carefully about the relationship between the loop indexes and the number being printed. Also, methods from the math library might be quite helpful.**

```
public static void main(String[] args) {
    Scanner stdin = new Scanner(System.in);
    System.out.println("How many layers for your layered square?");

    int n = _____;
```

```
}
```

6) (10 pts) The law of cosines allows you to solve for the length of the third side of a triangle if you know the lengths of the other two sides and the angle in between those two known sides. Specifically, if a and b are the known side lengths, and C is the included angle in between those sides, then we can solve for the third unknown side length, c , as follows:

$$c = \sqrt{a^2 + b^2 - 2ab\cos(C)}$$

Write a function that takes as input side lengths a and b as well as the included angle C (in radians), and returns the length of side c . **You must call the following methods from the math class: sqrt, pow, cos.**

```
public static double getSideC(double a, double b, double angleC) {
```

}

7) (10 pts) What is the output of the following code segment?

```
String orig = "AbCDeFaBCDef";
String second = orig.toLowerCase();
String s3 = orig.replace("a", "Z");
String s4 = second.replace("a", "Z");
String s5 = second;
second = second.toUpperCase();
System.out.println(orig+", "+second);
System.out.println(s3+", "+s4+", "+s5);
```

8) (10 pts) What is the output of running the main method shown below?

```
public static void main(String[] args) {  
    int[] vals = {3, 9, 12, 4, 1, 8, 11, 16, 7, 5};  
    int[] other = new int[10];  
    for (int i=0; i<10; i++)  
        other[i] = (vals[i] + vals[(i+1)%10])/2;  
    for (int i=0; i<10; i++)  
        System.out.print(other[i]+", ");  
    System.out.println();  
}
```

____ , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____ ,

9) (20 pts) A matrix is a two dimensional grid of numbers. Two matrices can be added if they have the same dimensions (same # of rows and same # of columns). To add two matrices, you just add the two corresponding values at each location. For example,

$$\begin{bmatrix} 3 & 4 & 2 \\ 7 & 1 & 6 \end{bmatrix} + \begin{bmatrix} 1 & 4 & 5 \\ 8 & 3 & 6 \end{bmatrix} = \begin{bmatrix} 4 & 8 & 7 \\ 15 & 4 & 12 \end{bmatrix}$$

On the next page, complete the method so that it adds the two input matrices and returns the resulting matrix as a two-dimensional array. If the dimensions of the two input matrices don't match, your method should return null. In your method, make sure to allocate space for a new two-dimensional array, store the appropriate values in that array and return that array.

```
public static int[][] add(int[][] m1, int[][] m2) {
```

```
}
```

10) (1 pt) Five Guys Burgers and Fries was started by Jerry Murrell and his wife, Janie in 1986. The five guys refers to both Jerry and his sons that were already born at the time. How many sons did Jerry have, back in 1986?

Java Language Reference

Math Class

Modifier and Type	Method	Description
static int	abs(int a)	Returns the absolute value of an int value.
static double	cos(double a)	Returns the cosine of the argument.
static int	max(int a, int b)	Returns the greater of two int values.
static int	min(int a, int b)	Returns the smaller of two int values.
static double	pow(double a, double b)	Returns the value of the first argument raised to the power of the second argument.
static double	sqrt(double a)	Returns the square root of a, or NaN if a is negative or NaN.

Random Class

Modifier and Type	Method	Description
int	nextInt(int bound)	Returns a pseudorandom, uniformly distributed int value between 0 (inclusive) and the specified value (exclusive), drawn from this random number generator's sequence.

String Class

Modifier and Type	Method	Description
char	charAt(int index)	Returns the char value at the specified index.
int	indexOf(int ch)	Returns the index within this string of the first occurrence of ch, or -1 if ch isn't in the string.
int	indexOf(int ch, int fromIndex)	Returns the index within this string of the first occurrence of ch at or after fromIndex, or -1 if ch doesn't appear in the string at or after fromIndex.
int	length()	Returns the length of this string.
String	replace(char oldChar, char newChar)	Returns a string resulting from replacing all occurrences of oldChar in this string with newChar.
String	toLowerCase()	Converts all of the characters in this String to lower case using the rules of the default locale.
String	toUpperCase()	Converts all of the characters in this String to upper case using the rules of the default locale.

Note: Scanner class on back.

Scanner Class

Modifier and Type	Method	Description
String	<code>next()</code>	Finds and returns the next complete token from this Scanner.
double	<code>nextDouble()</code>	Scans the next token of the input as a double.
int	<code>nextInt()</code>	Scans the next token of the input as an int.