

## CS 46A Homework 4

### Overview

In this assignment, you'll demonstrate your ability to write classes that have object constructors and callable methods.

### Learning Outcomes

By the end of this assignment, you should be able to ...

- create classes to simplify calculations.
- use Scanner objects to take input from a user.
- use string methods to modify a user-provided string.

### Guidelines

1. Use BlueJ to create your code.
2. You must name your classes exactly as specified. Otherwise Codecheck will not be able to process your submission and you will get no credit.
3. When you are finished with your code, submit it to Codecheck one final time then download the `.signed.zip` file.
4. You must upload all three `signed.zip` files together to Canvas and you should double check the files in Canvas to make sure all three zip files are uploaded.
5. Do not open the downloaded zip files. The files are digitally signed, and the grader program will check that they have not been opened.

## Problem 4A

Codecheck Link: [HERE](#)

### Goal:

In this problem, you will write a class called **PaintJob** that helps the Student Painters painting company – a company that paints dorm rooms – calculate the painting area and costs of their painting projects.

The dorm rooms have the following aspects:

- The rooms have one window and one door
- The rooms are rectangular
- The walls are 8 ft tall
- The doorway is 80 inches tall by 32 inches wide
- The window is 4 ft wide by 5 feet tall
- All four walls and the ceiling are painted

The painting company has the following costs:

- A gallon of paint costs \$31.95
- A gallon of paint will cover 300 square feet
- Student Painters charges \$100 per room, plus the cost of paint

A **PaintJobTester** class is provided for you to verify your **PaintJob** class works as expected.

### Instructions:

Start a new BlueJ project called hw4a in the cs46a/homework/hw04 folder. In the BlueJ project, create a class called **PaintJobTester** and copy the code from Canvas. Do not change this class in any way. Next, create another class called **PaintJob** and copy over the contents from Canvas. Fill in this class with the following:

1. A constructor:

```
public PaintJob(double theLength, double theWidth)
```

Constructs a new PaintJob object with the length and width of the room to paint.

Remember that the job of the constructor is to initialize the instance variables, not to do any calculations.

2. Six methods:

```
public double getLength()
```

Gets the length of the room in feet.

```
public double getWidth()
```

Gets the width of the room in feet

```
public void setDimensions(double newLength, double newWidth)
```

Set a new length and width of the room in feet.

```
public double surfaceArea()
```

Get the surface area of the room in square feet, excluding the area of the door and window

```
public double costOfPaint()
```

Get the cost of the paint for this job. Do not calculate surface area in this method. Instead, call the surfaceArea() method you defined above. Be sure to charge for the fractional gallons used – the leftover paint can be used for another job!

```
public double totalJobCost()
```

Gets the cost of this job. Do not calculate surface area or the cost of paint in this method.

Call other methods to get these values.

**Other tips and guidelines:**

- Add Javadoc comments to your code – this will be part of your grade.
- You will need to convert square inches for the door to square feet. There are 144 square inches in a square foot. Do not calculate a priori – use variables for this calculation!
- You will need to define and use constants for the cost of labor, the cost of a gallon of paint, and the number of square feet that a gallon will cover. Make these constants accessible to any class. Do not use any magic numbers in the code (except the number 2).
- In addition to the variables above, define the following constants in your class

```
public static final int SQ_INCHES_PER_SQ_FOOT = 144;
public static final double WALL_HEIGHT_IN_FEET = 8;
public static final double DOOR_HEIGHT_IN_INCHES = 80;
public static final double DOOR_WIDTH_IN_INCHES = 32;
public static final double WINDOW_HEIGHT_IN_FEET = 5;
public static final double WINDOW_WIDTH_IN_FEET = 4;
```

## Problem 4B

Codecheck Link: [HERE](#)

### Goal:

In this problem, you will write a Java application called **IntegerAndDouble** that uses a Scanner object to take inputs from the user. In particular, the program will take in an `int` and `double` and return several statements.

If the integer is provided is 3 and the double provided is 5.9, then the expected output of the program should look as follows:

```
Enter an integer: 3
The integer number is 3.
Enter a double number: 5.9
The double number is 5.9.
The square root of the double number is 2.4289915602982237.
The integer part of the double number is 5.
The quotient of the integer number divided by the double number
is 0.5084745762711864.
The double quotient of the integer number divided by the integer
part of the double number is 0.6.
The integer quotient of the integer number divided by the
integer part of the double number is 0.
The remainder of the integer number divided by the integer part
of the double number is 3.
```

### Instructions:

Start a new BlueJ project called hw4b in the cs46a/homework/hw04 folder. In the BlueJ project, create another class called **IntegerAndDouble** (there is no starter code provided for this example). Fill in this class with the following:

1. Ask the user to enter an integer using prompt "Enter an integer: "
2. Get the integer and store it in an integer variable
3. Print the integer on a new line
4. Ask the user to enter a double number using prompt "Enter a double number: "
5. Get the double number and store it in a double variable
6. Print the double number on a new line
7. Calculate and display the square root of the double number
8. Get the integer part of the double number and store it in an integer variable
9. Display the integer part of the double number on a new line
10. Calculate and display the quotient of the integer number divided by the double number
11. Calculate and display the double quotient of the integer number divided by the integer part of the double number
12. Calculate and display the integer quotient of the integer number divided by the integer part of the double number
13. Calculate and display the remainder of the integer number divided by the integer part of the double number

### Other tips and guidelines:

- Do not use the try-catch statement or any parse statements.

## Problem 4C

Codecheck Link: [HERE](#)

### Goal:

In this problem, you will write a Java application called **StringApplication** that uses a Scanner object to take inputs from the user. In particular, the program will take in a String and two ints and return several statements.

If the String is provided is "Big Java Early Objects" and the two ints provided are 0 and 5, then the expected output of the program should look as follows:

```
Enter a book title: Big Java Early Objects
The first character is 'B'.
The first word is "Big".
The rest of title is "Java Early Objects".
Enter the starting position for a substring: 0
Enter the length for the substring: 5
The 5-char substring starting at index 0 is "Big J".
```

### Instructions:

Start a new BlueJ project called hw4c in the cs46a/homework/hw04 folder. In the BlueJ project, create another class called **StringApplication** (there is no starter code provided for this example). Fill in this class with the following:

1. Create a Scanner object, declare a String variable and two int variables
2. Ask the user to enter a book title
3. Read in one line of input for book title
4. Print the first character of the book title within single quotes
5. Print the first word of the book title within double quotes.
6. Print the rest of the book title without the space after the first word within double quotes
7. Ask the user to enter the starting position for a substring
8. Read in the starting position and store it in the first int variable
9. Ask the user to enter the length for the substring
10. Read in the length and store it in the second variable
11. Print the substring of the book title specified by the starting position and the length within double quotes

### Other tips and guidelines:

- You can have local variables as needed but only create one Scanner object.
- You can assume that the book title has multiple words separated by single spaces, but no spaces at either end of the book title.
- Do not use the try-catch statement or any parse statements.