CSC72003 Assignment 1

Weight: 20% of your final mark

Due: 19 Aug 2019 10 pm

Specifications

Your task is to complete various exercises in BlueJ, using the Java language, and to submit these via the MySCU link created for this purpose.
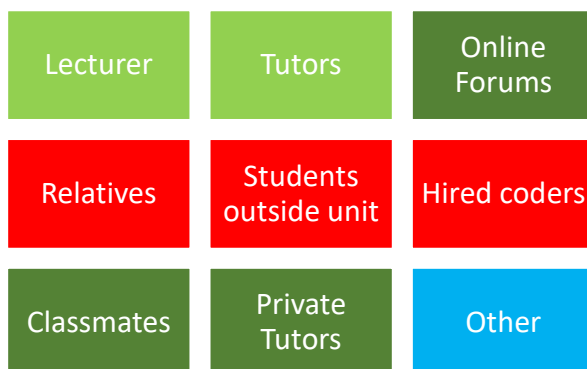
Marking criteria includes:

- Use of **correct coding style**, including the **use of comments**;
- **Accuracy** of coding;
- Use of **suitable coding structures**;
- **Correct submission** and **naming conventions** of assessment items as required.

Getting Help

This assignment is to be completed individually. It is the opportunity to gain an understanding of the concepts of object oriented programming and coding syntax. It is important that you master these concepts yourself. You are permitted to work from the examples in the study guide or textbook but you must acknowledge assistance from other textbooks or classmates. In particular, you **must not** use online material or help from others, as this would prevent you from mastering these concepts.

Who can you get help from? Use this diagram to determine from whom you may seek help with your program.

Lecturer	Tutors	Online Forums
Relatives	Students outside unit	Hired coders
Classmates	Private Tutors	Other

Encouraged

Attribution Required

Ask tutor

Not acceptable

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Assignment Q1

To be completed in week 1

Create a word document and call your document username-A1Q1.docx. For example, mine would be ahendr10-A1Q1.docx

Open the **house** project from chapter 1 of the book projects.

Open the terminal window and record method calls.

Create a picture with at least six (6) objects (circle, square, triangle, and person), recording all method calls.

Take a screenshot of your picture and add it to the word document you created earlier. Now copy the list of method calls needed to create the picture to the word document after the screenshot.

Add your name and student ID in the footer of the word document, as well as "CSC72003 Ass 1 Q1".

Assignment Q2

To be completed in week 2

Create a new BlueJ project called username-A1Q2. For example, mine would be ahendr10-A1Q2.

Click on New Class and give the class a name of **Computer**. Make sure "Java" and "class" are selected.

Write a **description** of your new Class in the top comments. Make sure you put in your name as the author and the date as the version you last worked on this exercise.

Add 2 fields that are suitable for a computer. One field should have a type of **int**, the other should have a type of **String**.

Add a third **boolean** field called **isNew**.

Write a **constructor** for your Computer class that takes two (2) parameters - the first of type **int**, the second of type **String**. Set the initial values of the first 2 fields that you created using the parameters.

Write **accessor** methods for all 3 of your fields

Write **mutator** methods for all 3 of your fields

Write a method called **printDetails**, which prints out all the details of a Computer object. Please have a look at the 'Printing' section in the Topic 2 study guide to see how to do this.

Take into account the **isNew** status. The printDetails method should have an if-else statement that prints a line saying that the computer is new, or the computer is not new.

Assignment Q3

To be completed in week 3

Create a new BlueJ project called username-A1Q3. For example, mine would be ahendr10-A1Q3.

Create a class called **Heater**, that contains four fields, **temperature**, **increment**, **max** and **min**, all of whose type is **double**.

Make sure you write a description of your new Class in the comments, with your name as author and date as the last date you worked on this exercise.

Define a **constructor** that takes and sets the min, max and sets the temperature to 20.0, and increment to 1.0.

Also define a **constructor** that takes no parameters. The temperature field should be set to the value of 20.0 in this constructor, increment to 1.0, and maximum and minimum to reasonable amounts.

Define the **mutators warmer** and **cooler**, whose effect is to increase or decrease the value of temperature by the increment respectively. The mutator methods should not let the temperature be set to a value higher than max, or lower than min.

Add a mutator **method** that sets the value of the **increment**. Add a check to make sure that the increment is not set higher than 3 or lower than 0.

Define an **accessor** method to return the value of **temperature**.

Test your work.

Zip the project and include in your assessment files.

Assignment Q4

To be completed in week 4

Create a new BlueJ project called your username-A1Q4. For example, mine would be ahendr10-A1Q4.

Create a class called **LotsOfNumbers**, that has one **ArrayList** field called **numbers**, which holds a collection of **Integers**.

Make sure you write a description of your new Class in the comments, with your name as author and give the version as the date you last worked on this exercise.

Define a **constructor** that initialises the ArrayList. Note that you can add any other initialisations that you feel are relevant.

Create methods to **add** elements, **remove** elements and **get** the number of elements in the collection. Make sure you add tests for errors and sensible error messages.

Create a method called **printNumbers**. This method should loop through the collection and print out the elements (each Integer on one line) as determined by the following rules;

- If the Integer is divisible by 3, instead of printing the Integer, it should print **divisible by 3**
- If the Integer is divisible by 5, instead of printing the Integer, it should print **divisible by 5**
- If the integer is divisible by both 3 and 5, then it should print **divisible by 3 and 5**
- If none of the prior criteria are met, then the method should print the Integer element.

For example, if the collection contained the Integers 1, 2, 3, 4, 5, 10, 2, 4, 15, 9, then the printout would look like:

1

2

divisible by 3

4

divisible by 5

divisible by 5

2

4

divisible by 3 and 5

divisible by 3

Once you have finished your project, open the terminal window in BlueJ and turn on record method calls. Create a new Numbers object, and then add at least eleven (11) Integers using

the add method you wrote. <u>Make sure you don't use the same collection as my example.</u> You must have an Integer that is divisible by 3, an Integer that is divisible by 5, and an Integer that is divisible by 3 and 5.

Demonstrate removing an element using the remove method you wrote, and then find the number of elements using your method. Finally, run your printNumbers method.

Copy all your calls into a text file and save it in your BlueJproject folder.

Assignment Q5

To be completed in week 5

<u>Part A:</u>

Imagine you need to open a standard combination dial lock but don't know the combination. Write a Java program in BlueJ with a method that prints all of the possible combinations, so you can print them on a piece of paper and check off each one as you try it. Assume the numbers on each dial range from **zero** to **ten** and **three** numbers in sequence are needed to open the lock. For example, the output would look like:

0-0-0

0-0-1

0-0-2

// lots more combinations

10-10-9

10-10-10

<u>Part B:</u>

Suppose the lock isn't a very good one and any number that's no more than **one** away from the correct number in each digit will also work.

Write another method that takes **3 parameters** of type **int** that are the combination of the lock. The method will print out a minimal list of combinations you would need to try to guarantee opening the lock.

For example, if the combination is 7-6-3 then 7-5-4, 6-6-2, 8-5-3 and other combinations will also open the lock. The first combination printed would be 6-5-2 and the last would be 8-7-4. You will also need to make sure that no number in the combinations that are printed is less that zero and greater than ten as the numbers on each dial range from **zero** to **ten**.

Submission

You should now have 4 BlueJ projects and 1 word document and a text file. You must zip the projects, the word document and the text file in into one zip file called usernameA1.zip. For example, mine would be ahendry10A1.zip

Submit this file via the Assignment 1 link on MySCU by the due date. Please leave enough time for it to upload, so do not submit at the last minute!