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| Academic Year | 2021 – 2022 | | |
| Semester | Fall | Winter | Summer |
| Course Code - Name | CSCI4001U – Mobile Devices | | |
| Instructor | Dr. Razi Iqbal | | |
| Assessment | Lab 2 |  | |
| Due Date | During Lab Session | | |

**Course Learning Outcomes:**

1. Understand the limitations and capabilities of mobile devices
2. Understand the architecture of typical mobile devices
3. Use widely available software tools to interact with mobile devices
4. Create mobile applications for a popular mobile platform
5. Store data in mobile applications
6. Design user interfaces for various device profiles

**Student ID:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lab 2**

This lab expects that you have already installed Dart SDK on your system and integrated it with Visual Studio Code. Although it is not necessary to have Dart SDK installed on your system and integrate it with Visual Studio Code but since instructor is going to use this combination throughout this course, it would be easier to follow. Having said that, you are free to use any editor (locally installed or online) to complete this lab.

**Instructions:**

In order to obtain maximum marks in this assignment, please ensure the followings:

* Don’t forget to write your ID on the first page of this document.
* Submit this assignment by writing your solution in this document under the Solution heading below. Do not use a separate document.
* This Lab has a weightage of **3%** marks of the course.
* This is **NOT** a group assignment so **students having similar assignments will get a 0.**
* You are required to submit the assignment on Canvas as instructed. Assignments through emails will not be accepted.
* Please submit this Lab during the lab session. If for some reason you are not able to submit during the lab session, please inform your TA.

**Question 1:**

Write a program in Dart that checks to see if all the elements of the list are prime numbers or not? You are required to create a function bool isPrime(List numbers) that takes a list as a parameter and returns true if all the elements of the list are prime and returns false even if one of the elements is not prime. Please note the followings:

* List should be created in the main method
* bool isPrime(List numbers) method should use forEach method of list to run through each element of the list and finds if the element is prime or not.
* The output of the program should be All elements of the list are Prime numbers if elements are prime and All elements of the list are Prime not numbers if even one of the elements is not prime.

**Solution:**

**Question 2:**

Write a program in Dart that checks to see if all the elements of the list are prime numbers or not just like what you did in Question 1 except, this time you are required to use a map function in dart? You can read about Dart map function on this link (<https://api.dart.dev/stable/2.13.4/dart-core/Iterable/map.html> ).

Please note the followings:

* You can perform all the implementation in the main method
* Use map method to iterate through each element of the list. (Hint: look into toList() method as well.)
* The output of the program should be All elements of the list are Prime numbers if elements are prime and All elements of the list are Prime not numbers if even one of the elements is not prime.

**Solution:**

**Question 3:**

Write a program in Dart that shows the usage of Classes. The program should have a class SmartDevices with the following members:

* String Brand
* String OS
* String Type
* String Feature

Furthermore, the class should have an overridden method toString() that should return a String.

Please note the followings:

* You need to create a short-form constructor for this class.
* Create two instances of this class in the main method which when printed should display the following respectively:
  1. Samsung Phone with Android operating system and makes calls.
  2. Apple Tablet with iOS operating system and has big screen.
* Please note that Samsung in instance 1 is Brand, Phone is Type, Android is OS and makes calls is Feature. Same applies to instance 2.

**Solution:**

**Question 4:**

Write a program in Dart to demonstrate the usage of mixins. The program should have a class Sportsman that contains the method called void isSportsman(). Create two mixins, Swimmer and Runner. Each mixin should have a method void iAmSwimmer() with a print statement saying, “I am a swimmer” and iAmRunner() with a print statement saying, “I am a runner” respectively.

Call these two mixin methods in void isSportsman() method of Sportsman class. Finally, in the main method, create an instance of Sportsman and call the isSportsman method to see if mixins are working with the class.

**Solution:**

**Question 5:**

Write a program in Dart to demonstrate asynchronous programming. The program should be able to sum all the integers from 0 to 1000000000. This would take your system some time to produce the output. Since Dart is more of single-threaded in nature, you need to create a Future to avoid halt of your main method. Please note the followings:

* You can write the whole program in the main method.
* Import dart:async to enable you to use Future constructor. (Hint: Use simple Future() constructor to create a basic Future constructor and provide it an anonymous function).
* The anonymous function should run a loop from 0 to 1000000000 and calculate the sum of all of these numbers (Hint: Create a double variable called sum to hold the total).
* Use one of the states of Future (Uncompleted, Completed with Value, Completed with Error) to display the value of the variable holding the total.
* Optional: Put a print statement before and after the future to see the behavior of the program.

**Solution:**