**British Columbia Institute of Technology**

### COMP-3912

**Swift Exam, Duration: 150 minutes**

**Summer 2023**

# Submission:

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* Please read each questions and create the corresponding swift files and submit them at the end to the LearningHub.
* The exam is out of 102 points
* There are 6 mandatory question and 1 optional (Question 7)

|  |  |
| --- | --- |
| Problem | Point |
| Problem1 | 20 |
| Problem2 | 20 |
| Problem3 | 15 |
| Problem4 | 20 |
| Problem5 | 15 |
| Problem6 | 10 |
| Problem7 | 2 points |
| Total | 102 |

* Swift Documentation can be found here: <https://developer.apple.com/documentation/swift/>
* This is an individual exam please do not communicate with anyone during the exam.
* This is open book meaning that you have access to your Swift source code for your assignments and also Swift developer documentation.
* Using any other website or service (like Google, ChatGPT, … is not allowed)

# Problem1

Consider the following protocol:

protocol StringConditionProtocol

{

//it checks whether a given condition is met on the current string

    func verifiableStringForACondition( \_ conditionPredicate: String->Bool) -> Bool

/\*it checks whether the string is a double repeated string.

For instance abab is a double repeated because the ab is repeated 2 times. Or AliAli is also double repeated.\*/

    func repeatedString()-> Bool

}

Now, extend the Swift **String** type to have the above requirements defined in the above protocol and also write some test scenarios to show how it works.

For this question:

1. you need to write code to show how you add these two functionalities to String
2. Implement *repeatedString*
3. Write some test (sample) scenarios to show how you use the 2 methods defined above.

**Submission:**

* Insert the **snapshot** of the testing your code here in this file.
* Upload the **problem1.swift** file to Learning Hub

Snapshot:

A screenshot of a computer code

Description automatically generated

# Problem2

The following snippet of code is given:

import Foundation

class Student{

private var age = 10

private var email = ""

private var takenCourses = 6

private var gpa = 68

init(\_ age: Int, \_ email: String, \_ takenCourses: Int, \_ gpa: Int){

self.age = age

self.email = email

self.takenCourses = takenCourses

self.gpa = gpa

}

}

class Search{

static func searchForStudents(list students: [Student], with condition: (Student)->Bool, their specification: (Student)->String,

action perform: (String)->Void){

for student in students{

if condition(student){

let spec = specification(student)

perform(spec)

}

}

}

}

let st1 = Student(23, "a.gmail.com", 5, 78)

let st2 = Student(22, "b.gmail.com", 8, 72)

let st3 = Student(19, "c.gmail.com", 7, 63)

let st4 = Student(25, "d.gmail.com", 6, 81)

let st5 = Student(24, "e.gmail.com", 4, 66)

let st6 = Student(22, "f.gmail.com", 7, 81)

var students:[Student] = []

students.append(st1)

students.append(st2)

students.append(st3)

students.append(st4)

students.append(st5)

students.append(st6)

Write code and insert the snapshots of the results for the following questions:

1. Call the searchForStudents method of the class Search to print the email address of the students who are older than 22
2. Call the searchForStudents method of the class Search to print the email address of the students who are between 20 and 23
3. Call the searchForStudents method of the class Search to print the email address and gpa of the students who have taken more than 5 courses
4. Call the searchForStudents method of the class Search to print the email address, gpa, age and number of courses all students in the list.

**Note:** You are not supposed to change the method searchForStudents

**Note:** You are allowed to add methods to the class Students if needed. But you are not allowed to change the original definition of the class Student.

**Note:** If you add any method to the class Student, please include the updated swift file.

**Submission:**

* Insert the **snapshot** of the testing your code here in this file.
* Upload the **problem2.swift** file to Learning Hub

# A screenshot of a computer program Description automatically generated

# Problem3

For each of the following example, design a class or structure (or both if needed) and identify which states (instance/class variables) each of the classes/structures have and create an instance from each class/structure with arbitrary values:

* A class/struct to show a mathematical Ellipse. A circle in mathematics is shown using the following formula:

aX^2 + bY^2 = 6

for example this is an ellipse: 5X^2+5Y^2 = 10

* A Directory could include files and other fire directories. For instance, in Directory IOSProject you can have the following:

Assignments: (which is a Directory)

Lectures: (which is a Directory)

Courseinfo.txt

sampleExam.pdf

**Submission:**

* Insert the **snapshot** of the testing your code here in this file.
* Upload the **problem3.swift** file to Learning Hub

**A screenshot of a computer

Description automatically generated**

# Problem4

Consider the following protocols:

Protocol Protocol1 {

    var property1: Int?

}

Protocol Protocol2 {

    var property2: String

}

Protocol Protocol3 {

    var property3: Int?->String

}

* Define an array called list1 whose elements are of a type (for instance a class) which conforms to all above protocol.
* Using protocol composition, define a dictionary whose keys are of type String and the values are of a type that conforms to all above (three above) protocols.

**Submission:**

* Insert the **snapshot** of the testing your code here in this file.
* Upload the **problem4.swift** file to Learning Hub

A screenshot of a computer

Description automatically generated

**Problem5**

The following picture shows a suitcase containing several items. Each item in the suitcase has a weight shown the following table:

|  |  |
| --- | --- |
| Item | Weight (germs) |
| key | 50 |
| battery | 40 |
| watch | 100 |
| ring | 30 |
| iPhone | 300 |
| Cup | 250 |
| Notebook | 150 |

We need to know the following information. Develop a Swift program with required classes/structures, methods and properties to implement the following use cases:

* The total weight of items in the suitcase
* The name of the item with the highest weight in the suitcase
* The list of items sorted based on their weight ascendingly.
  + For sorting use the *sorted* method in Swift.
  + Note: Sorted(by: ) : https://developer.apple.com/documentation/swift/array/2296815-sorted

**Submission:**

* Insert the **snapshot** of the testing your code here in this file.
* Upload the **problem5.swift** file to Learning Hub

A picture containing diagram

Description automatically generated

A screenshot of a computer

Description automatically generated

# Problem6

There are a few errors in this code snippet. Please found them, fix them and briefly explain why it was an error.

Note: Missing class or function or variable is not considered an error.

private var myViewController: LoginViewController = {

guard myViewController = UIStoryboard.myStoryboard.instantiateViewController(withIdentifier: LoginViewController.storyboardIdentifier) as LoginViewController else {

fatalError("Wrong View Controller")

}

myViewController.doLogin = { in

self.modifyView()

}

return myViewController

}()

* Insert the correct code in problem6.swift. Upload the **problem6.swift** file to Learning Hub
* Add comments in your file to explain the bugs

**Problem7 (Optional) – Free Bonus (2 points):**

There is no wrong answer to this question.

Your feedback is important to me.

You will get 2 points bonuses if you answer this question regardless of your comment or feedback.

Open question7 package and enter your answer there in the feedback file:

1. What have you liked about this course?
2. What have you disliked about this course so far?
3. What would be one or more thing you would do to improve the quality of the course and course delivery?
4. 4-Did you find this exam Hard / Easy / Fair?

**Things I liked about this course:**

I really loved this course, for letting me learn a lot and specially what I was planning to learn meanwhile putting it aside that I’ll learn it later. It was great that we weren’t really focusing on codding basics, and so on any rules/skills because we were expected to know them ahead. Some high classes courses in BCIT still do it, but was nice for us to not having it. Really liked the feedback speed from you, loved how open you are and ready to help as well. Mostly also loved that you have industry background it was very interesting to listen you.

**Things I disliked about this course:**

Wished we had more of SwiftUI rather than Storyboard, wished we would work with databases, and maybe any APIs as class practice for working with APIs for projects. Less swift as well, I would say more ios than swift and how it can be managed I will put in next paragraph where I say about changes. Time of a class also not really great, if it would’ve been start around 12pm and onwards could have been better experience for me, or weekday is even better for students I belive. Also lastly, wished maybe we would cove one lesson on how in industry of mobile dev looks like, and also touch a little bit on macOs WatchOS developments could have been fun as well in my opinion.

**What would I add or change:**

So my suggestion about more ios less swift would be, first two weeks try to cover all swift material and handle to students maybe recorded swift topics from you for any references or learn themselves. Also, a small booklet of swift all topics with samples and explanations from you this way you may provide swift assignments all 4 after first class but students will just need to submit them before final as a due date so they have plenty of time. This way gives plenty of IOS time and maybe even more content. I remember you were saying during semester you wanted to make 1v1 session project upgrades, that would be nice to trying always doing it, we did not have it unfortunately, but a really nice idea. Lastly, maybe through the course make swift homeworks and one project that student does like us and project with teacher which is your idea/project which has API, database, any additional sdks implementations so students will have an idea vision how they can implement everything in their project and not just ios and swift homeworks, does not have to be cool hard project, any simple.

**Final Exam Review:**

# Final exam was fairly medium-easy I would say. Found problem 1,2,5,6 fairly easy and 3,4 fairly medium moreover not sure if my solution for this 2 correct ☺

**Good Luck ☺**

Thanks for your hard work on this course in this semester. Keep on the good work. If you got a high grade in this course (above 80%) and you need a reference for your future job, I would be happy to help you with that.

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