CS265FZ Software Testing
Lab 1 – Equivalence Class Testing

There are THREE exercises to complete.

Two pieces of work need to be submitted:

1. Fill in this lab sheet and submit it to Moodle. You don't need to attach your source code in this form. You need to upload your source code separately.
2. Submit all the required source code to Moodle. Make sure your source code is tested in Eclipse and is executable.
3. Make sure you provide detailed comments in the source code:
    a. Identify the fault(s) in the source code
    b. How did you fixed the fault(s)?

Problem 1

A program (Source Code: ***Lab1_Program1.java***) is used by an airline company to automatically assess the level of insurance the customer must pay on their ticket. Each customer can bring one piece of sports equipment and one piece of musical equipment on a flight:
If they bring both sports and music equipment the insurance is €**20**
If they only bring one piece of equipment only then the insurance is €**10**
If they bring no equipment then the insurance fee is €**5**
The program input consists of two **boolean** variables:

1. ***sportsEquipment***
2. ***musicEquipment***

The program output is a single variable: ***insurance***

For this first lab exercise, the input and output equivalence class are given as below. You will need to use the same format for the rest of the lab exercises.

Input Equivalence Classes		
Parameter	Test Case	Partition
sportsEquipment	EC-1 EC-2	True False
musicEquipment	EC-3 EC-4	True False

Output Equivalence Classes		
Parameter	Test Case	Partition
Return Value	EC-5 EC-6 EC-7	5 10 20

Test ID	**Test Cases Covered**	**Inputs**		**Expected Output**
		sportsEquipment	***musicEquipment***	Return value
T1.1	EC-1, 3, 7	True	True	20
T1.2	EC-2, [3], 6	False	True	10
T1.3	EC-[2], 4, 5	False	False	5

Task 1

Based on the specification given above, write your testing code in JUnit 5 to test the source code of the program provided on Moodle ("***Lab1_Program1.java***"). Make sure your test code is named as "***Lab1_Task1.java***".

Task 2

Based on the test results, provide the correct version of the "***Lab1_Program1.java***", and rename it to "***Lab1_Program1_Fix.java***".

Problem 2

A program (Source Code: ***Lab1_Program2.java***) combines an exam and coursework mark into a single grade. The values for exam and coursework are integers. If the exam or coursework mark is less than 50% (< 50) then the grade returned is a "Fail". To pass the course with a "Pass, C", the student must score between 50% and 60% in the exam (50 <= exam < 60), and at least 50% in the coursework (course >= 50). They will pass the course with "Pass, B", if they score at least 60% in the exam (exam > 60) and 50% in the coursework (exam >= 50). In addition to this, if the average of the exam and coursework is at least 70%, then they are awarded a "Pass, A". Input values that are less than 0 or greater than 100 for either the exam or coursework are invalid and the program will return a message to say "Marks out of range".

Task 1

Identify the input equivalence classes and output equivalence classes.

Input Equivalence Classes		
Parameter	Test Case	Partition
exam	EC-1* EC-2 EC-3 EC-4 EC-5 EC-6*	[Integer.Min_value,0] (0,50) [50,60) [60,70) [70,100] (100,Integer.Max_value)
course	EC-7* EC-8 EC-9 EC-10 EC-11*	[Integer.Min_value,0] (0,50) [50,70) [70,100] (100,Integer.Max_value)

Output Equivalence Classes		
Parameter	Test Case	Partition
Return Value (***grade***)	EC-12 EC-13 EC-14 EC-15 EC-16*	Fail C B A Marks out of range

Task 2

Fill in the test data table

Test ID	**Test Cases Covered**	**Inputs**		**Expected Output**
		exam	***course***	Return value (***grade***)
T2.1	EC-1,7,16	-1	-1	null
T2.2	EC-2,8,12	45	45	Fail
T2.3	EC-3,9,13	55	55	C
T2.4	EC-4,9,14	65	65	B
T2.5	EC-5,10,15	70	70	A
T2.6	EC-6,11,[16]	101	101	null

Task 3

Based on the specification given above, write your testing code in JUnit 5 to test the source code of the program provided on Moodle ("***Lab1_Program2.java***"). Make sure your test code is named as "***Lab1_Task2.java***".

Task 4

Based on the test results, provide the correct version of the "***Lab1_Program2.java***", and rename it to "***Lab1_Program2_Fix.java***".

Problem 3

A program (Source Code: ***Lab1_Program3.java***) is used to assess the cost of a car insurance policy. It takes three inputs of age, gender and marital status. If the age entered is less than 16 or greater than 65, the program returns a premium of zero. The input for gender takes the form of 'M' for male and 'F' for female. If an incorrect value for the gender is entered the program returns a premium of **zero.** In general a premium is €500. However, if a person is male, under 25 and not married then an extra €1500 is added to the premium. If the person is female or married the premium falls by €200, and if the person is aged between 45 and 65 inclusive the premium falls by €100.

Task 1

Identify the input equivalence classes and output equivalence classes.

Input Equivalence Classes		
Parameter	Test Case	Partition
age	EC-1 EC-2 EC-3 EC-4 EC-5	(Integer.Min_value, 16) [16,25] (25,45) [45,65] (65, Integer.Max_value)
gender	EC-6 EC-7 EC-8*	M F !M!F
married	EC-9 EC-10	true false

Output Equivalence Classes		
Parameter	Test Case	Partition
Return Value (***premium***)	EC-11 EC-12 EC-13 EC-14 EC-15 EC-16	0 200 300 400 500 2000

Task 2

Fill in the test data table

Test ID	**Test Cases Covered**	**Inputs**			**Expected Output**
		age	***gender***	***married***	Return value (***premium***)
T3.1	EC-1,6,10,11	8	M	false	0
T3.2	EC-4,7,9,12	50	F	true	200
T3.3	EC-3,[6,9],13	30	M	true	300
T3.4	EC-4,[6,10],14	50	M	false	400
T3.5	EC-[3,6,10],15	35	M	false	500
T3.6	EC-[3,6,10],16	20	M	false	2000
T3.7	EC-5,8*,[10,11]	70	X	false	0

Task 3

Based on the specification given above, write your testing code in JUnit 5 to test the source code of the program provided on Moodle ("***Lab1_Program3.java***"). Make sure your test code is named as "***Lab1_Task3.java***".

Task 4

Based on the test results, provide the correct version of the "***Lab1_Program3.java***", and rename it to "***Lab1_Program3_Fix.java***".