ISLAMIC UNIVERSITY OF TECHNOLOGY

SWE 4302

LAB 2 GROUP B

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1 INTRODUCTION TO TDD

We have learned about test driven development, one of the famous framework to use for writing green code. The practice of writing tests before writing code became known as test-driven development (TDD). In its simplest form, TDD works like this:

- **Write a test**. Because the code does not yet exist, this test fails. Test runners usually display failing tests in red.
- **Make it run.** Write the code to make the test pass. Test runners commonly display passing tests in green.
- **Make it right.** Each time you return to green, you can refactor any code into a better shape, confident that it remains correct if the tests continue to pass.

Kent Beck describes this as the Red/Green/Refactor cycle and calls it "the TDD mantra."

In this development cycle, we will be writing several unit tests which are automated and can be executed each time the code is changed to ensure that new code does not break existing functionality. Each of these test contains three parts:

- Setup Create the specific environment required for the test.
- Do Perform the action to be tested.
- Verify Confirm the result is as expected.

TDD tells you to write the simplest code that will pass this test. In this case, your goal is to write only enough code to change the error message. In today's lab, you will be trying to solve the given problem using TDD.

The objective of today's lab,

1. Introduction to Test driven development (TDD)
2. Implementing TDD
3. Implementing unit test

2 TASK

Book Rental Calculator

You are now working on a library application which has a book rent calculator. The system should handle various book types, apply discounts for early returns, and calculate fines considering different tiers and caps.

Requiremnets

- Standard Book Renting Process
  - Any book can be for a standard period of 20 days.
  - Basic rent for each book is $6.
  - Each book type has a different fine structure.
- Fine Calculation:
  Fiction Books:
  - Base Fine: $1.00 per day overdue.
  - Additional Fine: $1.50 per day for every additional 10 days overdue.

  Non-Fiction Books:
  - Base Fine: $1.50 per day overdue.
  - Additional Fine: $2.50 per day for every additional 10 days overdue.

  Children's Books:
  - Base Fine: $0.50 per day overdue.
  - Additional Fine: $0.75 per day for every additional 10 days overdue.
- Early Return Discount:
  If a book is returned within 3 days of its due date, a 20% discount on the calculated fine is applied.
- Additional Fine:
  The fine calculation should consider different thresholds for additional fines:
  - 0-10 days overdue: Base fine applies.

- 11-20 days overdue: Base fine + 50% additional fine.
- 21-29 days overdue: Base fine + 75% additional fine.
- 30 days or more overdue: fine will be $100 per month.

Now write test cases for the above scenario and then a program that will be able to calculate the book rent. Please remember to follow the TDD steps for today's lab.