APCS Project Plan

Submitted to**:** **CS Department**

Project Manager**: Anish Lakkapragada**

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Project Overview

Our project is to create a game where users (on a Java GUI) are given functions and they have to practice differentiation by inputting the derivative function of the given function. The way this game works is that there are rows of "tiles", each of which represents a mathematical expression (e.g. "2x", "3x"). Players are given functions to differentiate, and select the correct answers by moving to the tiles that represent their answer. For example, if (on the GUI) the player is asked to differentiate "3x^2 + sin(x)" they should move to the tiles labeled with "6x" and "cos(x)" to create "6x+cos(x)". We are planning to use a third-party library, namely Expr, to check whether the user correctly differentiated the function on a number of test cases. If they answer incorrectly, they will lose points. While this can be a single-player application, we plan on implementing networking, where two players can compete against each other to get the most points by differentiating the quickest and most accurate.

Project Team

- Anish
    - Will work with Abhishek on structuring the GUI classes and components
    - Anish will mostly be in charge of dividing the functionality of our application into different files
    - Will implement the GUI component classes (once decided)
    - Will create slides/rehearse for the promotional presentation

- Abhishek
    - Will work with Abhishek on structuring the GUI components like Tiles
    - Will implement the GUI component classes (once decided)
    - Will create slides/rehearse for the promotional presentation
- Hank
    - Will work on creating the mathematical functionality to read Strings from user input and validate that they are the correct derivative (in a Structured class)
    - Will implement the GUI component classes (once decided)
    - Will create slides/rehearse for the promotional presentation

Challenges

One potential problem we see is that it may be difficult to read functions in string form into callable Java functions (even with the Expr library) as in the difference between how humans write functions and how Expr will interpret them. We are planning to implement String processing and using a Stack to validate whether the user-generated function (in String form from the tiles) will work for Expr.

Some of our team members have experience in single window GUI development, one challenge we see is creating the tile structure on the GUI while still maintaining the cleanliness of our code (by structuring different components of the GUI into different classes.)

If time permits, a final challenge is being able to implement the networking. We plan to do this after finishing the functionality for a single, locally-played player.

Major Tasks and Schedule

Task	When	Responsible

Read about GUI development in Java, watch tutorials on how to create GUI development	April 24th - 29th (Week 1)	Anish, Abhishek, Hank
Find a library online or research a way to take in a function f(x) in string form and get the function f'(x) in string form => decided on Expr	April 24th - 26th (Week 1)	Anish
Write all the methods (in the Differentiation class) including calculating the derivative of a function, and testing whether a given differentiation function (in String form) is correct	May 2 - May 5th (Week 2)	Hank
Design all the classes for creating the GUI development (tile class, driver class, etc.) Write down all the methods required in each class.	May 2 - May 6th (Week 2)	Abhishek, Anish
Divide the classes created amongst everyone to implement, then implement all the casses	May 9th - May 13th (Week 3)	Abhishek, Anish, Hank
Debug the application in the GUI and test corner cases specifically	May 11th - May 18th (Week 3-4)	Abhishek, Anish, Hank
Rehearse and work on the presentation before Week 5 (so during Week 5 we can have a buffer in case anything goes wrong)	May 16th - May 20th (Week 4)	Anish, Hank, Abhishek