Team 1 Project 1B

### PREPARED BY

Joe Simon

Eric Vaughn

James Demeritt

Jeff Kimani

2) System Design

[Show how the system is designed by your team. You need to explain your design, list all data structures you choose to implement the system and explain the role of each data structure.]

The system is designed by creating a class Polynomial with a child class Term, which has two variables (int coefficient and int exponent). The Polynomial class has a term\_list variable, which has a type of list<Term>. All functions inside the Polynomial class and Term child class are declared in the “Polynomial.h” file, and are initialized inside of the “Polynomial.cpp” file.

Inside the “Main.cpp” file, three Polynomial objects are created. The first two Polynomial objects take in a string, first\_p and second\_p, which are then used to instantiate the term\_list variable of both the first and second Polynomial objects through the set\_polynomial\_from\_string() function. After this, the third Polynomial object is instantiated through the overloaded “+” operator, which adds two Polynomial objects, which can be shown as “first + second;”. Once the first and second Polynomial object have been added together, the third polynomial storing the result will be sorted through the .sort() function, and then will be combined with the .combine() function. After this, the third polynomial is output into console using the overloaded “<<” operator.

Two data structures were implemented in the system; the doubly-linked list data structure and the iterator data structure. The doubly-linked list data structure is used inside the polynomial class to store all Terms of the polynomial. Once all of the Terms have been stored inside of term\_list, then the iterator data structure is used to iterate through the doubly-linked list to grab each Term inside of term\_list. This allows us to access the coefficient and the exponent of each Term.

3) UML Class Diagram

[Draw a **UML class diagram** for your system (please study UML by yourself). Clearly show the logic relationship among all classes in the diagram. For example, class Movie\_List is an aggregation of class Movie, which is a derived class of Media.t]

4) Two Test Cases

[Show at least **two test cases**. Each test case should contain a sequence of input data and operations. You need to give expected output and compare with the actual output.]

5) Contributions

[In a separate page, clearly list each team member's contribution to the project.]

1. Joe
   1. Helped create the Main.cpp file, declared set\_polynomial\_from\_string(), output\_term\_list(), sort(), combine(), operator +(), and operator <<() functions. Initialized set\_polynomial\_from\_string(), output\_term\_list(), operator +(), and operator <<() functions. Helped write Project report.
2. Eric
   1. Created “Polynomial.h”, “Polynomial.cpp”, and “test\_case\_1.cpp” files. Created the Constructor, Copy Constructor, and Destructor for the Polynomial class and the Term class. Declared the Polynomial and Term classes inside “Polynomial.h” file, Initialized sort(), clear(), combine(), and get\_polynomial() functions in the Polynomial public section. Redefined the set\_polynomial\_from\_string() and operator +() functions. Declared and initialized the variables for the Term class and get\_coefficent(), get\_exponent(), set\_coefficent(), and set\_exponent(), operator ==(), operator !=(), operator >(), operator <(), operator +(), and operator =() functions.
3. James
4. Jeff

6) Improvements

[Finally, you need to discuss what improvements to the system could be done in future.]