Project 4 Design Document

**Program Requirements**

A user will input up to a 7-digit hexadecimal value in reverse order. The program will then convert the hexadecimal value into decimal form. The input can not be any less than 1, and any more than 7. The user can stop the program at any time by inputting ‘Z’.

**Program Inputs**

* Hex input
  + hex
  + char value

**Program Outputs**

* Decimal value
  + decimal
  + Integer value

**Test Plan**

* Test for validity of program
  + Example:
    - input next hex value: A
    - input next hex value: 1
    - input next hex value: F
    - input next hex value: Z
    - The value in decimal form is: **3866**
  + Example 2:
    - Input next hex value: 1
    - Input next hex value: 4
    - Input next hex value: E
    - Input next hex value: 3
    - Input next hex value: Z
    - The value in decimal form is: **15937**
* Test to make sure valid number of inputs is given
  + Example:
    - Input next hex value: Z
    - **Invalid number of inputs given. Try again.**
  + Example 2:
    - Input next hex value: 1
    - Input next hex value: 1
    - Input next hex value: 1
    - Input next hex value: 1
    - Input next hex value: 1
    - Input next hex value: 1
    - Input next hex value: 1
    - Input next hex value: 1
    - Input next hex value: Z
    - **Invalid number of inputs given. Try again.**
* Test Sentinel Value
  + Example:
    - Input next hex value: 1
    - Input next hex value: D
    - Input next hex value: C
    - Input next hex value: Z
    - The value in decimal form is: **3281**
  + Example 2:
    - Input next hex value: 5
    - Input next hex value: D
    - Input next hex value: 3
    - Input next hex value: Z
    - The value in decimal form is: **981**
* Test for Correct Math
  + Example:
    - Input next hex value: 1
    - Input next hex value: D
    - Input next hex value: C
    - Input next hex value: Z
    - The value in decimal form is: **3281**
  + Example 2:
    - Input next hex value: 5
    - Input next hex value: D
    - Input next hex value: 3
    - Input next hex value: Z
    - The value in decimal form is: **981**

**Solution Overview**

Start by defining all needed libraries, in this case it will be “<iostream>” . You will then use the “std” namespace to save time on using input and output functions. Then, you will include the main function as well as all included variables. In this case it will be hex (char), tempHex (int), newHex, sum (int), and i (int).

You will then create a “while” loop with a condition that will run if hex does not equal Z and count is less than 7. You will then prompt for the user to input their next hex value, and they can press 0 to stop. You will then accept an input into the char value “hex”. This while loop will also include a counter update variable in order to test for the number of inputs given.

Then, you will create an “if” and “else if” conditional system to convert the hex char value into an int value. This value will be stored into “tempHex.”

You will then update the integer “i” in order to update the exponent for future calculations. You will then make a calculation stating that decimal equals tempHex \* 16^i (this is why you must update i in order to keep all of the calculations valid. Then you will add the already existing decimal number to this calculation.

You must then create an if statement within the while loop to test for a valid number of inputs. If it is less than 1 and more than 7, you will output an error statement.

Then, you will output the new decimal value calculated.

**Algorithm Flowchart**

