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Description automatically generated with medium confidenceSoftware Engineering Design – Advanced Programming Techniques, Semester 2022A

**LAB ASSESSMENT – MOCK TEST QUESTIONS**

Test Duration: 120 mins (+ 15 mins for submission)

NOTE: only do and submit **one source .cpp file for each question 1-2, and don’t zip them together.**

**Question 1 (40 pts)**

Write a C++ program which take a number as an argument from the command line, which is one of following data type:

* *an integer number (e.g. 12)*
* *a floating-point number (e.g. 3.14)*
* *a hexadecimal number which must be preceded by "0x" (e.g. 0x19, 0xAC).*

1. Write a function named **doubleVal**() with multiple overloaded versions that accept an integer, a floating-point number or a string represented a hexadecimal number, and return a doubled value *(with integer/ double data type).*
2. Use that function inside main() to print out the doubled value. *Format the I/O stream so that the precision is two digits after the decimal point for floating point value, and it prints outs in hexadecimal format (with 0x prefix) for hexadecimal value*

Note: Assume that the user always enters valid data with positive value only.

Hint: *You may need to use* [*stringstream*](https://stackoverflow.com/questions/1070497/c-convert-hex-string-to-signed-integer) *with I/O formatting to convert from any numerical string to integer/ double.*

**Sample Run:**

./a.exe 12  
24

./a.exe 12.1235  
24.25

./a.exe 0xAC  
0x158

**Question 2 (60 pts)**

Write a C++ program which defines a class named **Student** with private attributes ***name*** (string) and ***scores*** (an array of 3 integers to hold scores of the students). Provide constructor for the class.

1. Write two methods for the class

* **inputData**(): ask the user to input data (name and scores) for the student
* **showInfo**(): print out information of the student

Test them in main() with an object.

1. Overload the >> and << operators so that it can be used with Student objects as below

* **cin >> object** : it will call the inputData() function to input data
* **cout << object** : it will call the showInfo() function to print out info.
* **object1** **> object2**: return true if average score of object1 is larger than that of object2; return false otherwise.
* **float n** **+ object**: return a result object that has same name, but all scores are increased by **n**.

Test them all in main().

1. Create an array of 10 **Student** objects using dynamic memory allocation, and read all information from a file named **data.txt** (attached)toassign values for them.

Use **range based for loop** to find and print out info of the student with highest average score. Free up allocated memory at the end of the program

Hint: *you may need to use getline() function with delimiter.*