**Question01**: Write a **64-bit** x86-64 assembly language program that reads two complex numbers, each having real and imaginary part of type **double**, from an input textfile. It then writes to an output textfile the product and the division of the two numbers as well as the reciprocal of the first number.

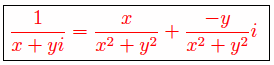
Note:

* Your program must define the complex numbers as appropriate **structures**.
* Your program must use procedures: **multiplyComplex**, **divideComplex**, and **reciprocalComplex** to do the required computations. These procedures must have no input or output statements. Each of the procedures must be called using the **Microsoft 64-bit calling convention** and they must return the real and imaginary values of the result in the **xmm0** and **xmm1** registers respectively.
* The input and output of your program must be done in the **main** procedure.

Hint: The relevant formulas are:

(x+yi)(u+vi) = (xu=yv)+(xv+yu)i

(x+yi)/(u+vi) equals (xu+yb)+(-xv+yu)i divided by (u^2+v^2)



|  |  |
| --- | --- |
| Sample input file: | Sample output file: |
| 5.0 6.0  3.0 -2.0 | Multiplication = 27.00000 + 8.00000i  Division = 0.23076 + 2.15384i  Reciprocal = 0.08196 – 0.09836i |
| 2.0 4.0  5.0 3.0 | Multiplication = -2.00000 + 26.00000i  Division = 0.64706 + 0.41176i  Reciprocal = 0.1 – 0.2i |

**Question02**: The C program below reads a textfile **QuizGrades.txt** of the form shown in page#3 and writes to an output file **QuizResults.txt** the average score of each student and the section average. **Translate the program to a 64-bit x86-64 assembly language program**:

**#include <stdio.h>**

**#include <stdlib.h>**

**#define NUMQUIZES 3**

**int main(void){**

**double grade, studentTotal, studentAverage, sectionTotal = 0.0, sectionAverage;**

**int m, n, studentID, totalNumberOfGrades = 0;**

**char name1[81], name2[81];**

**FILE \*quizInput, \*quizOutput;**

**if((quizInput = fopen("QuizGrades.txt", "r")) == NULL){**

**printf("Error in opening QuizGrades.txt\n");**

**exit(1);**

**}**

**quizOutput = fopen("QuizResults.txt", "w");**

**fprintf(quizOutput, "%-43s%-12s%s\n", "Name", "ID", "Average");**

**while(fscanf(quizInput, "%s%s%d", name1, name2, &studentID)!= EOF)**

**{**

**studentTotal = 0.0;**

**for(n = 1; n <= NUMQUIZES; n++)**

**{**

**fscanf(quizInput, "%lf", &grade);**

**studentTotal += grade;**

**}**

**studentAverage = studentTotal / NUMQUIZES;**

**fprintf(quizOutput, "%-20s%-20s%10d%10.2f\n", name1, name2, studentID, studentAverage);**

**sectionTotal += studentTotal;**

**totalNumberOfGrades += NUMQUIZES;**

**}**

**sectionAverage = sectionTotal / totalNumberOfGrades;**

**fprintf(quizOutput, "\n\nSection Average = %.2f", sectionAverage);**

**fclose(quizInput);**

**fclose(quizOutput);**

**printf("\n\nResults written to QuizResults.txt\n");**

**return 0;**

**}**

**QuizGrades.txt**

|  |
| --- |
| RASHID MUHAMMAD 9000010 50.0 80.5 67.5  AHMAD ZUBEIR 9000011 90.5 95.0 88.5  QASIM OMAR 9000012 45.0 50.0 60.0  MUSTAFA ABDALLAH 9000013 70.5 80.6 85.4  AMIN HASSAN 9000014 70.5 70.5 45.4  SAID ALI 9000015 80.5 81.6 65.5  ABDULKAREEM YUSUF 9000016 73.5 82.4 85.2  OMAR ABDALLAH 9000017 60.5 70.6 19.5  AMMAR RAJAB 9000018 70.5 85.3 35.7  MUHAMMAD SAID 9000019 92.5 89.5 46.9  ZAKARIAH TALHA 9000020 70.5 60.5 84.5  ABDULMAJED ATHMAN 9000021 45.5 80.9 95.6  SALEEM MUHAMMAD 9000022 70.5 87.3 80.2  ZULFIKAR KHAN 9000023 50.5 23.4 83.8  ABDULLATIF UBAIDA 9000024 70.5 90.2 75.6  BASHEER HUSSEIN 9000025 60.5 80.6 55.3  HASHEEM ABUBAKAR 9000026 70.5 70.5 25.7  ABDULRAZZAK MUNIR 9000027 80.5 90.6 77.5  AMJAAD SHAFEEQ 9000029 70.5 82.5 66.5  YAHYA MUHSIN 9000030 90.5 83.7 85.4 |

The output of your program in **QuizResults.txt** must be in the form:

