**Marcus Domingo**

**CSC205**

**Project 1: Assembly Language Programming in MARIE**

**PartA: Multiplication**

**Total possible points: 5 bonuses for part A**

**How to Submit:**

Please submit the following deliverables through Blackboard by the due date:

1. An electronic copy of the source code of your program (the .mas file) with proper documentations of what your code does.
2. A listing of the outputs given by your program for the specific inputs.

Write a program using the MARIE assembly language to evaluate the expression: *A \* B + C \* D* Your program should be able to perform the following:

1. [1 pts] Read in *A*, *B*, *C*, and *D* as inputs entered by the user. Output your result to the screen. (Your program does not need to create any user prompt. Figure out how to do the input/output in decimal values.)
2. [2 pts] Handle all inputs that are positive integers. Test your program on Test set I.
3. [1 pts] Handle any non-negative inputs. Test your program on Test set II.
4. [1 pts] Handle any integer inputs. Test your program on Test set III.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Test Set | Test number |  | Input | |  | Correct output | Your output |
| *A* | *B* | *C* | *D* |
| I | 1 | 2 | 3 | 4 | 5 | 26 | 26 |
| 2 | 1 | 1 | 1 | 1 | 2 | 2 |
| 3 | 8 | 3 | 3 | 2 | 30 | 30 |
| 4 | 2 | 11 | 12 | 1 | 34 | 34 |
| II | 5 | 0 | 7 | 9 | 2 | 18 | 18 |
| 6 | 7 | 0 | 1 | 3 | 3 | 3 |
| 7 | 0 | 0 | 3 | 8 | 24 | 24 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| III | 9 | -5 | 4 | 4 | 1 | -16 | -16 |
| 10 | 0 | -9 | 3 | 0 | 0 | 0 |
| 11 | 3 | 0 | -9 | -1 | 9 | 9 |
| 12 | -3 | 1 | 4 | -8 | -35 | -35 |
| 13 | 2 | 0 | 0 | -9 | 0 | 0 |
| 14 | -3 | 3 | 0 | 6 | -9 | -9 |
| 15 | -4 | -2 | -1 | -7 | 15 | 15 |
| 16 | -9 | -1 | 0 | 1 | 9 | 9 |
| 17 | 3 | -2 | 2 | 0 | -6 | -6 |

Grading criteria:

* 1. Your program is expected to assemble without error. Any program that cannot be assembled will receive NO credits.

* 1. Your program is expected to terminate gracefully. Any program that descends into an infinite loop on valid inputs will receive NO credits.

* 1. Your program will be *loaded exactly once*, and then *run multiple times*. You need to make sure that your variables are properly initialized at each run, without requiring the user to reload your program, or to reset the simulator.

* 1. The following is the testing procedure of your program:

Step 1: Your program (.mas) file will be loaded into MARIE’s editor and assembled.

Step 2: Your program’s machine code (.mex) file will be loaded into MARIE’s simulator, through the “File->Load” button on the menu bar.

Step 3: Your program will be run six (6) times through the “Run->Run” button on the menu bar.

Your program will be tested on one (1) random input quadruple (*A,B,C, D*) from *each* of the three provided test sets, and then three (3) random valid input quadruples from a private set.

Step 4: Done.