CSCI 2500 — Computer Organization
Homework 03 (document version 1.0) — Due October 14, 2021
"A déjà vu is usually a glitch in the Matrix. It happens when they change something."

- This homework is due by the Midnight EDT on the above date via a Submitty gradeable.
- This homework is to be completed **individually**. Do not share your code with anyone else.
- Homework assignments are available approximately ten calendar days before they are due. Plan to start each homework early. You can ask questions during office hours, in the Submitty forum, and during your lab session.

1 MIPS NxM Matrix Multiplication

This homework will be a repeat of Homework 1, except this time, you'll be coding it up in MIPS. As with Homework 1, the input will be two non-square matrices. You'll read these in from standard input, dynamically allocate space for these matrices, multiply them, and store them in a new matrix. Both input matrices as well as the result matrix will also be printed out. For ease of formatting your matrices, print a single tab character between values in a row and tab+newline characters at the end of each row.

All inputs (and outputs) will be integers. You don't need to do any error handling. You can assume every input is formatted correctly. A code template is provided with functions that you will fill in. You can't modify main, but you can otherwise add any additional helper functions that you might need.

Note that for ease of processing with the autograder, the input format for the matrices is slightly different. Instead of both N and M dimensions being on the first line of an input file, they will be separated onto two lines. In addition, two matrices will be stored in a single input file, one listed right after the other. If we consider the below matrices:

$$\text{matrix 1} = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}, \quad \text{matrix 2} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$$

They would be stored in the input file `input1.txt` as given on the next page, with the output of their multiplication via the MIPS program given beneath that.

```
bash$ cat input1.txt
2
3
1
2
3
4
5
6
3
2
1
2
3
4
5
6
bash$ spim -f hw03.s < input1.txt
SPIM Version 8.0 of January 8, 2010
Copyright 1990-2010, James R. Larus.
All Rights Reserved.
See the file README for a full copyright notice.
Loaded: /usr/lib/spim/exceptions.s
1       2       3
4       5       6
1       2
3       4
5       6
22      28
49      64
```

2 Submission and Grading Criteria

For this assignment, you will submit your code to the Submitty gradeable. A code template `hw03.s` is provided for your convenience. Note: you *must* submit your code with this filename for the autograding to work. You can not modify the main function. However, you can include any helper functions if you deem them necessary. The below will be the grading criteria for the assignment.

1. Autograding: 80%
    - Standard visible and hidden test cases
2. TA grading: 20%
    - Appropriate use of stack, heap, saved registers, calling conventions.
    - Code is properly formatted, commented (see `hw03.s` as an example), and consistently follows some MIPS style guidelines (see https://cs233.github.io/mipsstyle.html as an example).
    - No modifications to main, no abuse of autograder (gratuitous abuse gets a zero).