

**Department of Electrical & Computer Engineering  
University of California, Davis  
EEC 170 – Computer Architecture  
Spring Quarter 2025**

**Laboratory Exercise 2: Matrix Vector Multiplication**

*Due Date: May 2, 11:59PM PDT*

*Full Points 100*

**Objectives of Lab 2**

1. Learn RISC-V instruction set and assembly language programming.
2. Learn how complex data structures are created and manipulated in a computer
3. Learn how to call a function in assembly language

**Specification**

Matrix multiplication is the key operation in emerging applications like image, video processing and machine learning.

**What do you need to do?**

1. Write a function called **mvmult**, that multiplies **A**[1 x k] x **B**[k x k] to give **C**[1 x k] vector as the result.
2. Your function will take two parameters in register **x2** and **x3**, that will be the base addresses of row vector **A** and matrix **B**. The base address of the result row vector **C** is in register **x4**. Make sure you don't mess around with **x1** since it will be used to store the return address. You can use other registers in your code.
3. The matrices and vector are stored in **row-major** format.
4. Make sure your code works for different values of k, and matrices that have positive and negative elements, including 0.

**What to submit?**

1. Submit screenshots of your results for k = 4, 5, and 7 (2 screenshots for each value of k). If your program is not running correctly, also write down your analysis.
2. Submit your source code.

**Tips: Testing your program**

1. We have attached a Python script (test\_gen.py), along with a file (samples.txt) that contain pre-generated test samples.
2. You can run the Python script and copy the generated declarations of A and B to your .S file, and compare the results.
3. Or you can simply copy-paste the test samples in samples.txt and run your program to compare the results.