DS 623 PE04

For PE04, you will execute a simple Gram-Schmidt Process in R^2. Your code in the Jupyter Notebook should have the following properties:

1) Input: two independent nonzero vectors v_1 and v_2 in R^2 (i.e., two three-dimensional vectors)
2) Output:
    a. w_1: ($w_1 = \frac{v_1}{\|v_1\|}$)
    b. w_2: ($w_2 = \frac{y_2}{\|y_2\|}$ where $y_2 = v_2 - (v_2 \cdot w_1)w_1$)
3) Verification: verify w_1 and w_2
   Have length 1 and the dot product of w_1 and w_2 are zero. (The length and dot product should be close to 1 and 0 respectively.)

For this assignment, you can use any NumPy and SciPy operations. Use three decimal places for non-integer values.

Example)

Enter v1: np.array([2, 1])
Enter v2: np.array([-3, 0])

Output:
Two orthonormal bases are found below.
w1 - np.array([0.894, 0.447]),
w2 - np.array([-0.447, 0.894])

Verification:
Length of w1 is 1.000
Length of w2 is 1.000
Dot product is 0.000

If you need more challenge, you can extend it to R^3 using the following formulae.

a. w_3: ($w_3 = \frac{y_3}{\|y_3\|}$ where $y_3 = v_3 - (v_3 \cdot w_1)w_1 - (v_3 \cdot w_2)w_2$)