NMK40403: Lab Ex. Vectors in Python

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Ex. 1

1 Write a Python program to create an array of 5 integers and display the array items. Access individual elements through indexes. Sample Output:

1
3
5
7
9

Access first three items individually

1
3
5

2. Write a Python program to append a new item to the end of the array.
Sample Output:
Original array: array('i', [1, 3, 5, 7, 9])
Append 11 at the end of the array:
New array: array('i', [1, 3, 5, 7, 9, 11])

- Write a Python program to reverse the order of the items in the array.
  Sample Output
  Original array: array('i', [1, 3, 5, 3, 7, 1, 9, 3])
  Reverse the order of the items:
  array('i', [3, 9, 1, 7, 3, 5, 3, 1])

- Lists can be used to represent mathematical vectors. In this exercise and several that follow you will write functions to perform standard operations on vectors. Create a file named vectors.py and write Python code to make the doctests for each function pass. Write a function add_vectors(u, v) that takes two lists of numbers of the same length, and returns a new list containing the sums of the corresponding elements of each.

- Write a function dot_product(u, v) that takes two lists of numbers of the same length, and returns the sum of the products of the corresponding elements of each. Verify that dot_product passes the doctests above.

- Write a function add_matrices(m1, m2) that adds m1 and m2 and returns a new matrix containing their sum. You can assume that m1 and m2 are the same size. You add two matrices by adding their corresponding values. Verify your function.

- Write a function transpose that takes a matrix as an argument and returns is transpose. Then verify your function.

Cont.

- Find the perpendicular distance from the point (5, 6) to the line $-2x + 3y + 4 = 0$.
- Find the distance between the lines $4x + 3y + 6 = 0$ and $4x + 3y - 3 = 0$.
- The line $3x + 2y = 24$ meets the y-axis at A and the x-axis at B. The perpendicular bisector of AB meets the line through $(0, -1)$ parallel to the x-axis at C. The area of the triangle ABC is:

  A) 182 sq.units

  B) 91 sq.units

  C) 48 sq.units

  D) None of these