**CSS4204 Lab 2 รหัส 63122201019 ชื่อ-สกุล ชนิสรา ใจเย็น**

**1. แสดงผลลัพธ์ที่ได้จากการทำงานของโปรแกรม (NumPy)**

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| **Program** | **Expected output** |
| **a = [10,20,30,40,50]**  **b = [5,10,15,20,25]**  **c = a + b**  **print( c )** | **[10, 20, 30, 40, 50, 5, 10, 15, 20, 25]** |
| **def add\_vector(a, b):**  **c = [ a[i]+b[i] for i in range(len(a)) ]**  **return c**  **a = [10,20,30,40,50]**  **b = [5,10,15,20,25]**  **c = add\_vector(a,b)**  **print( c )** | **[15, 30, 45, 60, 75]** |
| **import numpy as np**  **a = np.zeros((4,3))**  **b = np.identity(3)** | **[[0. 0. 0.]**  **[0. 0. 0.]**  **[0. 0. 0.]**  **[0. 0. 0.]]**  **[[1. 0. 0.]**  **[0. 1. 0.]**  **[0. 0. 1.]]** |
| **import numpy as np**  **a = np.array([10,20,30])**  **b = np.array([1,2,3])**  **c = a + b**  **print(c)**  **type(c)** | **[11 22 33]**  **numpy.ndarray** |
| **a1 = np.array([1.0, 2.0, 3.0])**  **a2 = np.array([1, 2, 3], float)** | **[1. 2. 3.]**  **[1. 2. 3.]** |
| **import numpy as np**  **a = np.array( [ [1,2,3], [10,20,30] ] )**  **print(a)**  **print(a.shape)** | **[[ 1 2 3]**  **[10 20 30]]**  **(2, 3)** |
| **import numpy as np**  **x = np.zeros((2,3))**  **y = np.ones((3,2))**  **z1 = np.arange(10)**  **z2 = np.arange(2,10,dtype=np.float)**  **z3 = np.arange(2, 3, 0.1)** | **[[0. 0. 0.]**  **[0. 0. 0.]]**  **[[1. 1.]**  **[1. 1.]**  **[1. 1.]]**  **[0 1 2 3 4 5 6 7 8 9]**  **[2. 3. 4. 5. 6. 7. 8. 9.]**  **[2. 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9]** |
| **import numpy as np**  **x = np.array([[1, 2, 3], [4, 5, 6]], float)**  **y = np.zeros\_like(x)**  **y1 = np.ones\_like(x)**  **z = np.identity(4, float)** | **[[1. 2. 3.]**  **[4. 5. 6.]]**  **[[0. 0. 0.]**  **[0. 0. 0.]]**  **[[1. 1. 1.]**  **[1. 1. 1.]]**  **[[1. 0. 0. 0.]**  **[0. 1. 0. 0.]**  **[0. 0. 1. 0.]**  **[0. 0. 0. 1.]]** |
| **a1 = np.array(range(3,7))**  **a2 = np.array([[1,2],[3,4]])**  **print(a1)**  **print(a2)**  **print(a1.shape)**  **print(a.size)**  **print(a1.ndim)**  **print(a2.shape)**  **print(a2.size)**  **print(a2.ndim)** | **[3 4 5 6]**  **[[1 2]**  **[3 4]]**  **(4,)**  **6**  **1**  **(2, 2)**  **4**  **2** |
| **a3 = np.array([[[1,2],[3,4]],[[5,6],[7,8]]])**  **a4 = np.array([[1,2],[3,4,5]])**  **print(a3.dtype)**  **print(a4.dtype)** | **int64**  **object** |
| **a5 = np.array([1,2,3,4],dtype='int16')**  **a6 = np.array([1,2,3,4],dtype='float32')**  **print(a6)** | **[1. 2. 3. 4.]** |
| **a7 = np.array([[1,2],[3.,'4']]) print(a7) print(a7.dtype)** | **[['1' '2']**  **['3.0' '4']]**  **<U32** |
| **array = np.array([[1,2,3],[4,5,6]])**  **print(array[0][1])**  **print(array[1][2])**  **print(array[0,2])**  **print(array[1,1])**  **print(array[1][:])**  **print(array[1,:])** | **2**  **6**  **3**  **5**  **[4 5 6]**  **[4 5 6]** |
| **m=np.array([[1, 2, 3], [3, 6, 9], [2, 4, 6]])**  **print(m)**  **print(m[1, 2])**  **print(m[1])**  **print(m[:,1])**  **print(m[1, 1:3])**  **print(m[::2, ::2])**  **m[:, 0] = [0, 9, 8]**  **print(m)** | **[[1 2 3]**  **[3 6 9]**  **[2 4 6]]**  **9**  **[3 6 9]**  **[2 6 4]**  **[6 9]**  **[[1 3]**  **[2 6]]**  **[[0 2 3]**  **[9 6 9]**  **[8 4 6]]** |
| **a2 = np.array([[13,14,15,16], [17,18,19,20],[21,22,23,24]])**  **print(a2[1:2,2:3])**  **print(a2[0:2,1:3])**  **print(a2[0,1:3])**  **print(a2[::2,2])**  **print(a2[::-1,::-1])** | **[[19]]**  **[[14 15]**  **[18 19]]**  **[14 15]**  **[15 23]**  **[[24 23 22 21]**  **[20 19 18 17]**  **[16 15 14 13]]** |
| **import numpy as np**  **x = np.array([[1,2],[3,4]])**  **y = np.array([[5,6],[7,8]])**  **z = x+y**  **z = np.add(x,y)**  **z = x-y**  **z = np.subtract(x,y)**  **z = x\*y**  **z = np.multiply(x,y)**  **z = x/y**  **z = np.divide(x,y)**  **z = np.sqrt(x)** | **[[1 2]**  **[3 4]]**  **[[5 6]**  **[7 8]]**  **[[1. 1.41421356]**  **[1.73205081 2. ]]** |
| **x = np.array([[1,2],[3,4],[5,6]])**  **u = np.array([2]) + x**  **w = np.array([10,20]) + x**  **v = np.array([[10],[20],[30]]) + x** | **[[1 2]**  **[3 4]**  **[5 6]]**  **[[3 4]**  **[5 6]**  **[7 8]]**  **[[11 22]**  **[13 24]**  **[15 26]]**  **[[11 12]**  **[23 24]**  **[35 36]]** |
| **import numpy as np**  **x = np.array([1,2,3,4])**  **print( x + 2 )**  **print( 3 \* x )**  **print( x\*\*2 )**  **print( x + [2] )**  **print( x + [1,2,3,4] )** | **[3 4 5 6]**  **[ 3 6 9 12]**  **[ 1 4 9 16]**  **[3 4 5 6]**  **[2 4 6 8]** |
| **import numpy as np**  **def translation2D(m,dx,dy):**  **return m + np.array([dx,dy])**  **m1 = np.array([ [-7,2],[-5,7],[-1,0] ])**  **m2 = translation2D(m1, 7, -3)**  **print(m2)** | **[[ 0 -1]**  **[ 2 4]**  **[ 6 -3]]** |
| **from numpy import array**  **a = array([1, 2, 3])**  **print(a)**  **b = 2**  **print(b)**  **c = a + b**  **print(c)** | **[1 2 3]**  **2**  **[3 4 5]** |
| **from numpy import array**  **A = array([[1, 2, 3], [1, 2, 3]])**  **print(A)**  **b = array([1, 2, 3])**  **print(b)**  **C = A + b**  **Print(C)** | **[[1 2 3]**  **[1 2 3]]**  **[1 2 3]**  **[[2 4 6]**  **[2 4 6]]** |
| **from numpy import array**  **A = array([[1, 2, 3], [1, 2, 3]])**  **print(A.shape)**  **b = array([1, 2])**  **print(b.shape)**  **C = A + b**  **print(C)** | **ValueError: operands could not be broadcast together with shapes (2,3) (2,)** |
| **import numpy as np**  **import matplotlib.pyplot as plt**  **x = np.arange(0.0, 5\*np.pi, 0.1)**  **y = np.sin(x)**  **plt.plot(x,y)**  **plt.show()** |  |
| **import numpy as np**  **x = np.array([1,2,3])**  **y = np.array([4,5,6])**  **z = x.dot(y)**  **z = np.dot(x,y)**  **print(z)** | **32** |
| **import numpy as np**  **x = np.array([[1,2,3],[4,5,6]])**  **y = np.array([[7,8],[9,10],[11,12]])**  **z = x.dot(y)**  **z = np.dot(x,y)**  **print(z)** | **[[ 58 64]**  **[139 154]]** |

**2. matplotlib**

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| **Program** | **Expected output** |
| **import matplotlib.pyplot as plt**  **X = range(1, 30)**  **Y = [value \* 3 for value in X]**  **print("Values of X:")**  **print(\*range(1,30))**  **print("Values of Y :")**  **print(Y)**  **plt.plot(X, Y)**  **plt.xlabel('x - axis')**  **plt.ylabel('y - axis')**  **plt.title('Draw a line.')**  **plt.show()** | **Values of X:**  **1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29**  **Values of Y :**  **[3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87]** |
| **import matplotlib.pyplot as plt**  **x = [1,2,3]**  **y = [2,4,1]**  **plt.plot(x, y)**  **plt.xlabel('x - axis')**  **plt.ylabel('y - axis')**  **plt.title('Sample graph!')**  **plt.show()** |  |
| **import matplotlib.pyplot as plt**  **with open("D:/data/test.txt") as f:**  **data1 = f.read()**  **data1 = data1.split('\n')**  **x = [row.split(' ')[0] for row in data1]**  **y = [row.split(' ')[1] for row in data1]**  **plt.plot(x, y)**  test.txt 10 20 20 40 30 10  **plt.xlabel('x - axis')**  **plt.ylabel('y - axis')**  **plt.title('Sample graph!')**  **plt.show()** |  |
| **import numpy as np**  **import matplotlib.pyplot as plt**  **x = np.linspace(0, 2, 100)**  **plt.plot(x, x, label='linear')**  **plt.plot(x, x\*\*2, label='quadratic')**  **plt.plot(x, x\*\*3, label='cubic')**  **plt.xlabel('x label')**  **plt.ylabel('y label')**  **plt.title("Simple Plot")**  **plt.legend()**  **plt.show()** |  |