**p.2**

import numpy as np

arr = np.array([10,20,30])

print(arr)

arr = np.array([10,20,30.])

print(arr)

arr0=np.zeros(5)

arr1 = np.ones(5)

print(arr0)

print(arr1)

arr1 = np.arange(0, 100, 20)

arr2 = np.linspace(0, 100, 5)

print(arr1)

print(arr2)

**p.3**

arr1 = np.array([1,2,3,5,8])

print(arr1)

print(arr1 + 10)

print(arr1 - 10)

print(arr1 \* 2)

print(arr1 / 2)

print(arr1 % 2)

arr1 = np.array([1,2,3,5])

arr2 = np.array([8,13,21,34])

print(arr2 + arr1)

print(arr2 - arr1)

print(arr2 \* arr1)

print(arr2 / arr1)

print(arr2 % arr1)

**正方単位行列**

arr1=np.identity(3)

arr2=np.identity(5)

print(arr1)

print(arr2)

**非正方単位**

arr1=np.eye(5,7,0)

arr2=np.eye(5,7,2)

print(arr1)

print(arr2)

**正方の対角行列**

arr1=np.diag([1,2,3])

arr2=np.diag([3,5,8,13,21])

print(arr1)

print(arr2)

**行列→ベクトル**

arr1=np.array([1,2,3,5,8,13,21,34,55])

arr2=arr1.reshape((3,3))

print(arr1)

print(arr2)

**ベクトル→行列**

arr1=np.diag([1,2,3,5])

arr2=np.ravel(arr1)

print(arr1)

print(arr2)

**転置行列**

import numpy as np

arr1=np.array([1,2,3,5,8,13,21,34,55])

arr2=arr1.reshape((3,3))

print(arr2)

print(arr2.T)

arr3=arr2.T

print(arr3)

**内積、外積**

arr1=np.array([1,2,3])

arr2=np.array([5,8,13])

arr3=np.inner(arr1,arr2)

arr4=np.outer(arr1,arr2)

print(arr3)

print(arr4)

**行列の加減乗除計算**

arr1=np.matrix([[1,2,3],

[5,8,13],

[21,34,55]])

arr2=np.identity(3)

print(arr1)

print(arr2)

print(arr1+arr2)

print(arr1-arr2)

print(arr1\*arr2)

print(arr2/arr1)

arr1=np.array([[1,2,3],

[5,8,13],

[21,34,55]])

arr2=np.array([[1,0,0],

[0,1,0],

[0,0,1]])

print(arr1+arr2)

print(arr1-arr2)

print(arr1\*arr2)

print(arr2/arr1)

**ドット積、テンソル積**

arr1=np.array([[1,2,3],

[5,8,13],

[21,34,55]])

arr2=np.array([[2,1,1],

[1,3,1],

[1,1,4]])

print(np.dot(arr1,arr2))

print(np.outer(arr1,arr2))

arr1=np.matrix([[1,2,3],

[5,8,13],

[21,34,55]])

arr2=np.matrix([[2,1,1],

[1,3,1],

[1,1,4]])

print(np.dot(arr1,arr2))

print(np.outer(arr1,arr2))

**行列の垂直結合、水平結合**

arr1=np.matrix([[1,2,3],

[5,8,13],

[21,34,55]])

arr2=np.identity(3)

print(np.hstack([arr1,arr2]))

print(np.vstack([arr1,arr2]))

arr1=np.matrix([[1,2,3],

[5,8,13],

[21,34,55]])

arr2=np.identity(3)

print(np.bmat([[arr1,arr2],[arr2,arr1]]))

**行列の垂直分離、水平分離**

arr1=np.arange(16).reshape(4,4)

(v1,v2)=np.vsplit(arr1,2)

(h1,h2)=np.hsplit(arr1,2)

print(arr1)

print()

print(v1)

print(v2)

print(h1)

print(h2)

**総和の計算**

arr1=np.arange(16).reshape(4,4)

print(arr1)

print()

print(np.sum(arr1))

print(np.sum(arr1,axis=0))

print(np.sum(arr1,axis=1))

**最大、最小**

arr1=np.arange(16).reshape(4,4)

print(arr1)

print()

print(np.min(arr1))

print(np.min(arr1,axis=0))

print(np.min(arr1,axis=1))

print(np.max(arr1))

print(np.max(arr1,axis=0))

print(np.max(arr1,axis=1))

**統計**

rr1=np.array(np.random.randint(0,100,(10,10)))

print('平均'+str(np.mean(arr1)))

print('平均'+str(np.mean(arr1,axis=0)))

print('平均'+str(np.mean(arr1,axis=1)))

print('中央'+str(np.median(arr1,axis=0)))

print('中央'+str(np.median(arr1,axis=1)))

print('分散'+str(np.var(arr1)))

print('分散'+str(np.var(arr1,axis=0)))

print('分散'+str(np.var(arr1,axis=1)))

print('偏差'+str(np.std(arr1)))

print('偏差'+str(np.std(arr1,axis=0)))

print('偏差'+str(np.std(arr1,axis=1)))

**行列のべき乗**

arr1=np.matrix([[1,2,3],

[5,8,13],

[21,34,55]])

re0=np.linalg.matrix\_power(arr1,0)

re1=np.linalg.matrix\_power(arr1,1)

re2=np.linalg.matrix\_power(arr1,2)

print(re0)

print(re1)

print(re2)

**逆行列、行列式**

arr1=np.matrix([[0,1,2],

[3,5,8],

[21,34,55]])

print(np.linalg.inv(arr1))

print(np.linalg.det(arr1))