```
import math
import random
import numpy as np

#Матриця



#1.1
print ('      ')
a=np.matrix([[1, 2], [4, -1]])
print (' #1.1 ')
print (' A = ')
print(a)
print ('      ')

b=np.matrix([[2,-3],[-4,1]])
print (' B = ')
print(b)
print ('      ')

c = a*b - b*a
print (' C = A*B - B*A')
print(c)
print ('      ')
#2.1
print (' #2.1 ')

z=np.matrix([[-1,2],[0,1]])
print (' Z = ')
print(z)
print ('      ')

k = z**2
print (' K = Z**2')
print(k)
print ('      ')

#3.1
print (' #3.1 ')
```

```
File  Edit  Shell  Debug  Options  Window  Help
>>>
================== RESTART: C:/

 #1.1
 A =
[[ 1  2]
 [ 4 -1]]

 B =
[[ 2 -3]
 [-4  1]]

 C = A*B - B*A
[[ 4 -8]
 [12 -4]]

 #2.1
 Z =
[[-1  2]
 [ 0  1]]

 K = Z**2
[[1 0]
 [0 1]]

 #3.1
 W =
[[ 3  5]
 [ 6 -1]]

 F =
[[ 2  1]
 [-3  2]]

 T = W*F
[[-9 13]
 [15  4]]

 #4.4
 M =
```

```
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print (' #4.4 ')
m=np.matrix([[1,2,3],[-1,2,1],[1,
print (' M = ')
print(m)
print ('      ')

v = np.linalg.det(m)
print (' V = |M|')
print(v)
print ('      ')

#5.1

print (' #5.1 ')
q=np.matrix([[1,2,3,4],[-2,1,-4,3
print (' Q = ')
print(q)
print ('      ')

y = np.linalg.det(q)
print (' Y = |Q|')
print(y)
print ('      ')

#6.3
print (' #6.3 ')
ck=np.matrix([[1,2,2],[2,1,-2],[2
print (' CK = ')
print(ck)
print ('      ')

tm=np.linalg.inv(ck)
print ('Обернена матриця CK=')
print(tm)
print ('      ')

#7.1
print (' #7.1 ')
lt=np.matrix([[1,2,3,4],[3,-1,2,5
print (' LT = ')
```

```
IDLE Shell 3.10.0
File  Edit  Shell  Debug  Options  Window  Help
 T = W*F
[[-9 13]
 [15  4]]

 #4.4
 M =
[[ 1  2  3]
 [-1  2  1]
 [ 1  3  2]]

 V = |M|
-7.999999999999998

 #5.1
 Q =
[[ 1  2  3  4]
 [-2  1 -4  3]
 [ 3 -4 -1  2]
 [ 4  3 -2 -1]]

 Y = |Q|
900.0000000000009

 #6.3
 CK =
[[ 1  2  2]
 [ 2  1 -2]
 [ 2 -2  1]]

Обернена матриця CK=
[[ 0.11111111  0.22222222  0.22222222]
 [ 0.22222222  0.11111111 -0.22222222]
 [ 0.22222222 -0.22222222  0.11111111]]

 #7.1
 LT =
[[ 1  2  3  4]
 [ 3 -1  2  5]
 [ 1  2  3  4]
 [ 1  3  4  5]]
```

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```
print(rank)
print ('      ')


#8.3

#kramera

print (' #8.3 ')

A = np.array ([[3,-5,3], [1,2,1],

B = np.array ([[1,-5,3], [4,2,1],

C = np.array ([[3,1,3], [1,4,1],

D = np.array ([[3,-5,1], [1,2,4],
print (' A = ')
print(A)
print (' B = ')
print(B)
print (' C = ')
print(C)
print (' D = ')
print(D)
det_A=np.linalg.det(A)
print('det_A=',det_A)
det_B=np.linalg.det(B)
print('det_B=',det_B)
det_C=np.linalg.det(C)
print('det_C=',det_C)
det_D=np.linalg.det(D)
print('det_D=',det_D)
x = det_B/det_A
y = det_C/det_A
z = det_D/det_A
print('x=',x)
print('y=',y)
print('z=',z)
```

оптиметоди оптиметоди

IDLE Shell 3.10.0

File Edit Shell Debug Options Window Help

```
 #7.1
 LT =
[[ 1  2  3  4]
 [ 3 -1  2  5]
 [ 1  2  3  4]
 [ 1  3  4  5]]

 RANK =
2

 #8.3
 A =
[[ 3 -5  3]
 [ 1  2  1]
 [ 2  7 -1]]
 B =
[[ 1 -5  3]
 [ 4  2  1]
 [ 8  7 -1]]
 C =
[[ 3  1  3]
 [ 1  4  1]
 [ 2  8 -1]]
 D =
[[ 3 -5  1]
 [ 1  2  4]
 [ 2  7  8]]
det_A= -33.0
det_B= -33.0
det_C= -33.000000000000014
det_D= -33.0
x= 1.0
y= 1.0000000000000004
z= 1.0

#9.5

 mat1 =
[[4 1 4]
 [1 1 2]
```

```python
#9.5
#матричний метод
print(' ')

print('#9.5')
mat1 = np.matrix([[4,1,4], [1,1,2], [2,1,2]])
mat2 = np.matrix([[-2], [-1], [0]])
mrt = np.linalg.inv(mat1)
result = mrt * mat2
print(' ')
print(' mat1 = ')
print(mat1)
print(' ')
print(' mat2 = ')
print(mat2)
print(' ')
print(' result =  ')
print(result)
print("revision = ")
print(np.linalg.solve(mat1, mat2))


#Розділ2
#Завдання 3


print (' Розділ 2 завдання 3 ')
print (' ')
#a[n][m]
n = 4
m = 5
#b = np.matrix[n,m]

b=np.matrix([[1,4,5,2,3],[4,0,-3,1,3],[4,-7,2,-1,
print (' b = ')
print(b)
print ('     ')


i0 = 0
```

```
File  Edit  Shell  Debug  Options  Window  Help
 mat1 =
[[4 1 4]
 [1 1 2]
 [2 1 2]]

 mat2 =
[[-2]
 [-1]
 [ 0]]

 result =
[[ 1.]
 [ 2.]
 [-2.]]
revision =
[[ 1.]
 [ 2.]
 [-2.]]
 Розділ 2 завдання 3

 b =
[[ 1  4  5  2  3]
 [ 4  0 -3  1  3]
 [ 4 -7  2 -1  8]
 [ 7 -2  0  5 -9]]


 середні значення по рядках
3.0
1.0
1.2
0.2

 середні значення по стовпчиках
4.0
-1.25
1.0
1.75
1.25
>>>
```