Experiment No.....

$$T(x,y) = \left(\frac{5x+y}{2}, \frac{-x-9y}{2}\right)$$

Program:

```
import numpy as np
from numpy import linalg as la
def T(x,y,z):
    return (x-y+z, 2*x+3*y-(1/2)*z, x+y-2*z)
B1 = np.array([[-1,1,0],[5,-1,2],[1,2,1]])
print("The specified basis for the domain space is \n", B1)
B2 = np.array([[1,1,0],[0,0,1],[1,5,2]])
print("The specified basis for the codomain space is \n",B
U1 = T(-1,1,0)
U2 = T(5,-1,2)
U3 = T(1,2,1)
Print("Evaluating T at the vectors of basis B1: ",U1,U2,U3
V1 = la.solve(B2,T,U1)
V2 = la.solve(B2,T,U2)
V3 = la.solve(B2,T,U3)
M = np.array([V1,V2,V3])
print("The matrix of the linear transformation is: \n",M.T)
```

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2.
```
from sympy import *
import numpy as np
x, y, c1, c2 = symbols('x y c1 c2')
A = Matrix([[2,3], [4, -5]])
u1 = np.array([1,-1])
u2 = np.array([1,1])
v1 = np.array([1,0])
v2 = np.array([0,1])
Tu1 = A[0,0] * v1 + A[1,0] * v2
Tu2 = A[0,1] * v1 + A[1,1] * v2
print("The images of the ordered basis vectors in B1 under the transformation T expressed using the basis vectors of B2 are, Tu1, Tu2)
eq = c1 * u1 + c2 * u2 - [x,y]
sol = solve(eq, c1, c2, dict = True)
c1 = sol[0][c1]
c2 = sol[0][c2]
print('The co-ordinates of any arbitrary vectors (x,y) w.r.t the basis B1 are', c1, 'and', c2)
T = c1 * Tu1 + c2 * Tu2
print('The linear transformation T on any arbitary vector (x,y) is T(x,y) =', tuple(T))
```

Output of N
11/5/22

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