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ROLL NO : 53

EXPERIMENT NO : 05

AIM : To find range space and null space of a linear transformation .

QUESTION . 01

In [1]:

V = W = QQ^3  
var('x1, x2, x3')

Out[1]: (x1, x2, x3)

In [2]:

f(x1, x2, x3) = [x1-x2-x3, x1+3\*x2+x3, -3\*x1+x2-x3]  
T = linear\_transformation(V, W, f)  
T

Out[2]: Vector space morphism represented by the matrix:  
[ 1 1 -3]  
[-1 3 1]  
[-1 1 -1]  
Domain: Vector space of dimension 3 over Rational Field  
Codomain: Vector space of dimension 3 over Rational Field

In [3]:

u = vector(QQ, [1, 2, -1])  
T(u)

Out[3]: (0, 6, 0)

In [4]:

T.image()

Out[4]: Vector space of degree 3 and dimension 3 over Rational Field  
Basis matrix:  
[1 0 0]  
[0 1 0]  
[0 0 1]

In [5]:

T.kernel()

Out[5]: Vector space of degree 3 and dimension 0 over Rational Field  
Basis matrix:  
[]

QUESTION . 02 ( SELF )

In [6]:

V = W = QQ^3  
var('x1, x2, x3')

Out[6]: (x1, x2, x3)

In [7]:

f(x1, x2, x3) = [x1+x2+x3, x1+5\*x2-x3, 6\*x1-x2+3\*x3]  
T = linear\_transformation(V, W, f)  
T

Out[7]: Vector space morphism represented by the matrix:  
[ 1 1 6]  
[ 1 5 -1]  
[ 1 -1 3]  
Domain: Vector space of dimension 3 over Rational Field  
Codomain: Vector space of dimension 3 over Rational Field

In [8]:

u = vector(QQ, [3, 2, 1])  
T(u)

Out[8]: (6, 12, 19)

In [9]:

T.image()

Out[9]: Vector space of degree 3 and dimension 3 over Rational Field  
Basis matrix:  
[1 0 0]  
[0 1 0]  
[0 0 1]

In [10]:

T.kernel()

Out[10]: Vector space of degree 3 and dimension 0 over Rational Field  
Basis matrix:  
[]

Conclusion: Problems on linear transformation, range space and null space are successfully executed.

In [0]:

