Started on	Saturday, 7 December 2024, 9:01 PM
State	Finished
Completed on	Saturday, 7 December 2024, 9:08 PM
Time taken	7 mins 10 secs
Marks	1.00/1.00
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Write the algorithm for QR decomposition using the Gram-Schmidt method.

For example:

Input	Result

`([[1, 1, 0], [1,0,1], [0, 1, 1]])`	`The Q Matrix is`
	` [[ 0.70710678  0.40824829 -0.57735027]`
	` [ 0.70710678 -0.40824829  0.57735027]`
	` [ 0.          0.81649658  0.57735027]]`
	`The R Matrix is`
	` [[1.41421356 0.70710678 0.70710678]`
	` [0.         1.22474487 0.40824829]`
	` [0.         0.         1.15470054]]`

Answer: (penalty regime: 0. %)

Reset answer

```
'''
Program to QR decomposition using the Gram-Schmidt method
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RegisterNumber: 24900025
'''
import numpy as np
def QR_Decomposition(A):
    n, m = A.shape
    Q = np.empty((n,m))
    u = np.empty((n,m))
    R = np.zeros((n,m))
    u[:, 0] = A[:, 0]
    Q[:,0] = u[:, 0]/np.linalg.norm(u[:,0])

    for i in range(1, n):
        u[:, i] = A[:, i]
        for j in range(n):
            u[:, i] -= (A[:, i]@Q[:,j])*Q[:,j]
        Q[:, i] = u[:, i]/np.linalg.norm(u[:, i])
    for i in range(n):
        for j in range(i, m):
            R[i, j] = A[:, j]@Q[:, i]
    print(f"The Q Matrix is \n {Q}")
    print(f"The R Matrix is \n {R}")
a = np.array(eval(input()))
QR_Decomposition(a)
```

	Input	Expected	Got	
✓	([[1, 1, 0], [1,0,1], [0, 1, 1]])	The Q Matrix is [[0.70710678 0.40824829 -0.57735027] [0.70710678 -0.40824829 0.57735027] [0. 0.81649658 0.57735027]] The R Matrix is [[1.41421356 0.70710678 0.70710678] [0. 1.22474487 0.40824829] [0. 0. 1.15470054]]	The Q Matrix is [[0.70710678 0.40824829 -0.57735027] [0.70710678 -0.40824829 0.57735027] [0. 0.81649658 0.57735027]] The R Matrix is [[1.41421356 0.70710678 0.70710678] [0. 1.22474487 0.40824829] [0. 0. 1.15470054]]	✓
✓	([[12, -51, 4], [6, 167, -68], [-4, 24, -41]])	The Q Matrix is [[0.85714286 -0.39428571 -0.33142857] [0.42857143 0.90285714 0.03428571] [-0.28571429 0.17142857 -0.94285714]] The R Matrix is [[14. 21. -14.] [0. 175. -70.] [0. 0. 35.]]	The Q Matrix is [[0.85714286 -0.39428571 -0.33142857] [0.42857143 0.90285714 0.03428571] [-0.28571429 0.17142857 -0.94285714]] The R Matrix is [[14. 21. -14.] [0. 175. -70.] [0. 0. 35.]]	✓

Passed all tests! ✓

▸ Show/hide question author's solution (Python3)

Correct

Marks for this submission: 1.00/1.00.