Covariance matrix of a two-dimensional dataset

TOTAL POINTS 5

1.Question 1
Compute the covariance matrix for the following dataset

D={[12], [54]}
Here, every column vector represents a data point.
Do the exercise using pen and paper.

1 / 1 point

- [4 2], [2 1]
- [2 4], [2 1]
- [1 2], [2 4]

2.Question 2
Consider a data set D with covariance matrix

[3 2], [2 4].
What is the covariance matrix if we multiply every vector in \mathcal DD by 2?

1 / 1 point

- [16 8], [8 12]
- [3 2], [2 4]
- [12 8], [8 16]
- [4 2], [2 3]

3.Question 3
Consider the data set

D={[12], [74]} with covariance matrix
[9 3] ,[3 1].

Compute the new covariance matrix when we add

[2], [2] to each element in \mathcal DD.

1 / 1 point

- [11 5], [5 3]
- [1 0], [0 1]
- [9 3], [3 1]

4.Question 4

Provide a valid 2x2 covariance matrix by replacing the -1 entries in the code below.

1 / 1 point

```
def covariance_matrix():
  """Return a valid 2x2 covariance matrix"""
  covariance_matrix = np.array([[1, 0.8],
                                [0.8, 1]])
  return covariance_matrix

print(covariance_matrix())
```

RunReset

```
[[ 1.   0.8]
 [ 0.8  1. ]]
```

5.Question 5

We are looking at a data set D where every element in D consists of an x and y coordinate. The data covariance matrix is given by
[1 0.8], [0.8 1]
Which of the following statements is correct?

1 / 1 point

- (•) x and y are positively correlated, i.e., when x increases then y increases on average, and vice versa.
- ( ) x and y are negatively correlated, i.e., when x increases then y decreases on average, and vice versa.
- ( ) x and y are uncorrelated, i.e., when x increases then y does not change on average (and vice versa).