5/5 points (100.00%)

Quiz, 5 questions

✓ Congratulations! You passed!

Next Item

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5/5 points (100.00%)

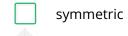
Quiz, 5 questions

1.

The function

$$eta(\mathbf{x},\mathbf{y}) = \mathbf{x}^T egin{bmatrix} 2 & -1 \ -1 & 1 \end{bmatrix} \mathbf{y}$$

is



Correct

Yes:
$$\beta(\mathbf{x}, \mathbf{y}) = \beta(\mathbf{y}, \mathbf{x})$$

not positive definite

Un-selected is correct

not bilinear

Un-selected is correct

an inner product

Correct

It's symmetric, bilinear and positive definite. Therefore, it is a valid inner product.

bilinear

Correct

Yes:

- \bullet β is symmetric. Therefore, we only need to show linearity in one argument.
- For any $\lambda \in \mathbb{R}$ it holds that $\beta(\mathbf{x} + \lambda \mathbf{z}, \mathbf{y}) = \beta(\mathbf{x}, \mathbf{y}) + \lambda \beta(\mathbf{z}, \mathbf{y})$. This holds because of the rules for vector-matrix multiplication and addition

5/5 points (100.00%)

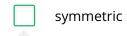
Quiz, 5 questions

2.

The function

$$eta(\mathbf{x},\mathbf{y}) = \mathbf{x}^T egin{bmatrix} 1 & -1 \ -1 & 1 \end{bmatrix} \mathbf{y}$$

is



Correct

Correct: $\beta(\mathbf{x}, \mathbf{y}) = \beta(\mathbf{y}, \mathbf{x})$

not an inner product

Correct

Correct: Since $\boldsymbol{\beta}$ is not positive definite, it cannot be an inner product.

not positive definite

Correct

With $x=[1,1]^T$ we get $\beta(\mathbf{x},\mathbf{x})=0$. Therefore β is not positive definite.

an inner product

Un-selected is correct

not symmetric

Un-selected is correct

bilinear

Carract

5/5 points (100.00%)

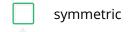
Quiz, 5 questions

3.

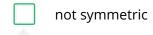
The function

$$eta(\mathbf{x},\mathbf{y}) = \mathbf{x}^T egin{bmatrix} 2 & 1 \ -1 & 1 \end{bmatrix} \mathbf{y}$$

is



Un-selected is correct



Correct

Correct: If we take $\mathbf{x}=[1,1]^T$ and $\mathbf{y}=[2,-1]^T$ then $\beta(\mathbf{x},\mathbf{y})=0$ but $\beta(\mathbf{y},\mathbf{x})=6$. Therefore, β is not symmetric.

bilinear

Correct

Correct.

not bilinear

Un-selected is correct

an inner product

Un-selected is correct

not an inner product

Correct

Correct: Symmetry is violated.

5/5 points (100.00%)

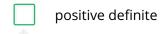
Quiz, 5 questions

4.

The function

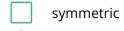
$$eta(\mathbf{x},\mathbf{y}) = \mathbf{x}^T egin{bmatrix} 1 & 0 \ 0 & 1 \end{bmatrix} \mathbf{y}$$

is



Correct

It is the dot product, which we know already. Therefore, it is positive definite.



Correct

It is the dot product, which we know already. Therefore, it is symmetric.

not positive definite

Un-selected is correct

bilinear

Correct

It is the dot product, which we know already. Therefore, it is positive bilinear.

an inner product

Correct

It is the dot product, which we know already. Therefore, it is also an inner product.

5 of 6

5/5 points (100.00%)

Quiz, 5 questions

5.

For any two vectors $\mathbf{x}, \mathbf{y} \in \mathbb{R}^2$ write a short piece of code that defines a valid inner product.

```
import numpy as np
 1
 2
 3
   def dot(a, b):
 4
      """Compute dot product between a and b.
 5
        a, b: (2,) ndarray as R^2 vectors
 6
 7
 8
      Returns:
        a number which is the dot product between a, b
 9
10
11
12
      dot_product = a[0]*b[0]+a[1]*b[1]
13
      return dot_product
14
15
16
    # Test your code before you submit.
                                                      Run
17
    a = np.array([1,0])
18
    b = np.array([0,1])
                                                     Reset
19
    print(dot(a,b))
```

Correct Response

Good job!

O P P

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