← Properties of inner products

5/5 points (100.00%)

Quiz, 5 questions

✓ Congratulations! You passed!

Next Item



1/1 points

1.

The function

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

is



Correct

Yes:

- 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.
- not an inner product

Un-selected is correct

positive definite

Correct

Yes, the matrix has only positive eigenvalues and $\beta(\mathbf{x},\mathbf{x})>0$ for all $\mathbf{x}\neq\mathbf{0}$ and $\beta(\mathbf{x},\mathbf{x})=0\iff\mathbf{x}=\mathbf{0}$

an inner product

Correct

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

not bilinear

Un-selected is correct

not positive definite

Un-selected is correct

not symmetric

Un-selected is correct

symmetric

Correct

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

5/5 points (100.00%)

2. Quiz, 5 questions The function

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

is



Un-selected is correct

bilinear

Correct

Correct:

- β is symmetric. Therefore, we only need to show linearity in one argument.
- $\beta(\mathbf{x} + \lambda \mathbf{z}, \mathbf{y}) = \beta(\mathbf{x}, \mathbf{y}) + \lambda \beta(\mathbf{z}, \mathbf{y})$. This holds because of the rules for vector-matrix multiplication and addition.
- not symmetric

Un-selected is correct

positive definite

Un-selected is correct

not an inner product

Correct

Correct: Since β is not positive definite, it cannot be an inner product.

symmetric

Correct

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

not positive definite

Correct

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

not bilinear

Un-selected is correct



3.

The function

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

is

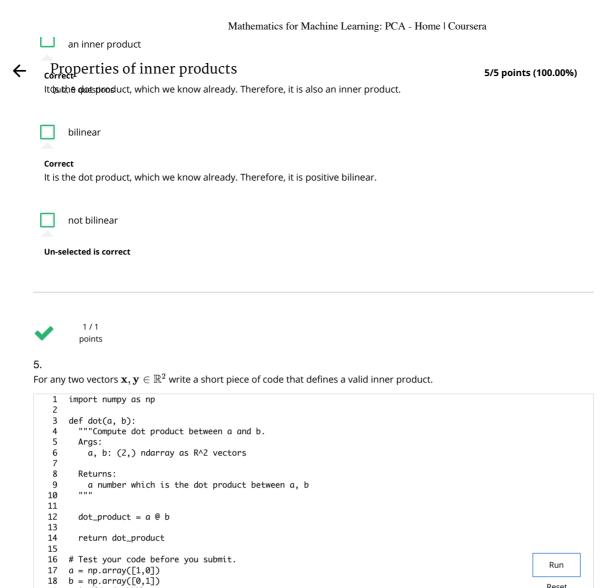
symmetric

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Un-selected is correct Properties of inner prod	ducts	5/5 points (100.00%
Quiz, 5 questions not symmetric		
Correct: If we take $\mathbf{x} = [1,1]^T$ and \mathbf{y}	$\mathbf{y} = [2,-1]^T$ then $eta(\mathbf{x},\mathbf{y}) = 0$ bu	at $eta(\mathbf{y},\mathbf{x})=6.$ Therefore, eta 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.		
1/1 points		
4. The function		
$eta(\mathbf{x},\mathbf{y}) = \mathbf{x}^T egin{bmatrix} 1 & 0 \ 0 & 1 \end{bmatrix} \mathbf{y}$		
is symmetric		
Correct		
It is the dot product, which we know a	already. Therefore, it is symmetric	
not positive definite		
Un-selected is correct		
positive definite		
Correct It is the dot product, which we know a	already. Therefore, it is positive de	efinite.
not symmetric		
Un-selected is correct		

https://www.coursera.org/learn/pca-machine-learning/exam/xg9K6/properties-of-inner-products

not an inner product

Un-selected is correct



Correct Response

print(dot(a,b))

Good job!





