General inner products: lengths and distances

Practice Quiz, 5 questions

4/5 points (80%)

Congratulations! You passed!

Next Item

1 / 1 point

1.
Compute the length of

$$\mathbf{x} = \begin{bmatrix} 1 \\ -1 \\ 3 \end{bmatrix}$$

using the inner product defined

$$\langle \mathbf{a}, \mathbf{b} \rangle = \mathbf{a}^T \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix} \mathbf{b}$$

Do the exercise using pen and paper.

- 26
- $\sqrt{31}$
- $\sqrt{29}$
- $\sqrt{11}$
- $\sqrt{26}$

Correct
Good job.

0 / 1 point

General inner products: lengths and distances

Practice Quiz, 5 questions

4/5 points (80%)

2.

Compute the squared distance between

$$\mathbf{x} = \begin{bmatrix} \frac{1}{2} \\ -1 \\ -\frac{1}{2} \end{bmatrix}$$

and

$$\mathbf{y} = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

using the inner product defined as

$$\langle \mathbf{a}, \mathbf{b} \rangle = \mathbf{a}^T \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix} \mathbf{b}$$

Do the exercise using pen and paper.

- 5
- $\sqrt{\frac{9}{2}}$
- $\frac{9}{2}$
- $\sqrt{5}$

This should not be selected

We are interested in the **squared** distance.

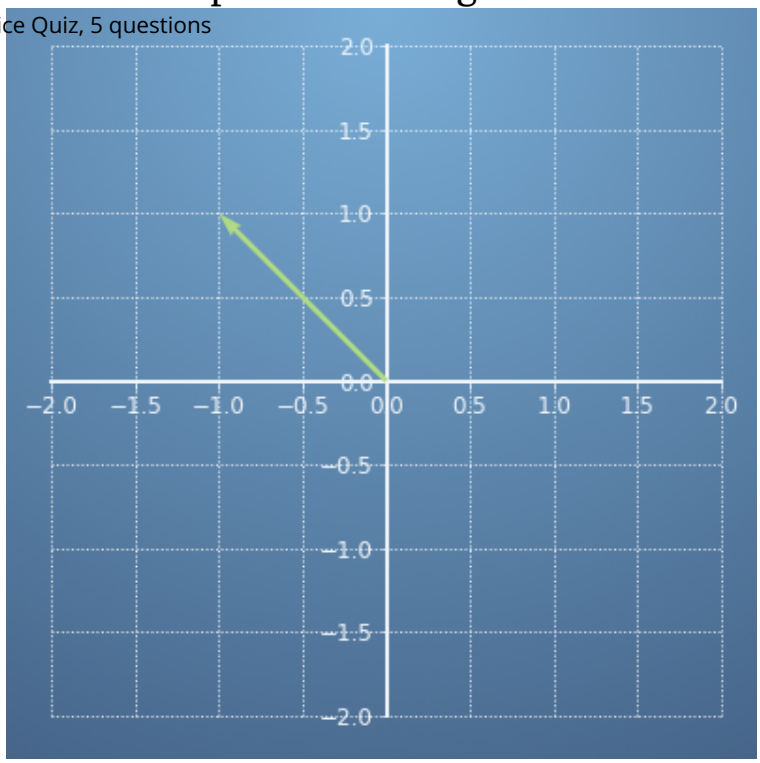
1 / 1 point

3.

General inner products: lengths and distances

Practice Quiz, 5 questions

4/5 points (80%)



Compute the length of $\mathbf{x} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$ using the inner product defined by

$$\langle \mathbf{a}, \mathbf{b} \rangle = \mathbf{a}^T \frac{1}{2} \begin{bmatrix} 5 & -1 \\ -1 & 5 \end{bmatrix} \mathbf{b}$$

Do the exercise using pen and paper.

- $\sqrt{2}$
- $\sqrt{12}$
- $\sqrt{6}$

Correct
Good job!

- 6
- 12

1 / 1 point

General inner products: lengths and distances

Practice Quiz, 5 questions

4/5 points (80%)

4.

Compute the distance (not squared) between

$$\mathbf{x} = \begin{bmatrix} 4 \\ 2 \\ 1 \end{bmatrix}$$

and

$$\mathbf{y} = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

using the inner product defined as

$$\langle \mathbf{a}, \mathbf{b} \rangle = \mathbf{a}^T \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix} \mathbf{b}$$

Do the exercise using pen and paper (and calculator if necessary). Please enter a decimal number.

6.5

Correct Response

Well done!

---

1 / 1 point

5.

Compute the length of $\mathbf{x} = \begin{bmatrix} -1 \\ -1 \\ -1 \end{bmatrix}$ using the inner product defined as $\langle \mathbf{a}, \mathbf{b} \rangle = \mathbf{a}^T \mathbf{I} \mathbf{b}$ where $\mathbf{I}$ is the identity matrix.

Do the exercise using pen and paper.

- [x] $\sqrt{3}$

Correct

Well done! Our inner product is the dot product.

- [ ] $-\sqrt{3}$
- [ ] 3

General inner products: lengths and distances

Practice Quiz, 5 questions

4/5 points (80%)