TRUE/FALSE QUESTIONS

EUCLIDEAN SPACES AND ABSTRACT VECTOR SPACES

Chapter #8,9

(1) Addition in the vector space, \( \mathbb{R}^2 \), is a function from \( \mathbb{R}^2 \times \mathbb{R}^2 \) into \( \mathbb{R}^2 \).

(2) Addition in the vector space, \( \mathbb{R}^2 \), is a function from \( \mathbb{R}^4 \) into \( \mathbb{R}^2 \).

(3) The scalar product in the vector space, \( \mathbb{R}^2 \), is a function from \( \mathbb{R} \times \mathbb{R}^2 \) into \( \mathbb{R}^2 \).

(4) The scalar product in the vector space, \( \mathbb{R}^2 \), is a function from \( \mathbb{R}^2 \times \mathbb{R} \) into \( \mathbb{R}^2 \).

(5) An inner product in the vector space, \( \mathbb{R}^2 \), is a function from \( \mathbb{R}^2 \times \mathbb{R}^2 \) into \( \mathbb{R}^2 \).

(6) In the vector space \( \mathbb{R}^2 \) the Euclidean distance function is a function from \( \mathbb{R}^2 \) into \( \mathbb{R} \).

(7) In the vector space \( \mathbb{R}^2 \) the Euclidean distance function is a function from \( \mathbb{R}^2 \times \mathbb{R}^2 \) into \( \mathbb{R}^2 \).

(8) In the vector space \( \mathbb{R}^2 \) the Euclidean distance function is a function from \( \mathbb{R}^2 \times \mathbb{R}^2 \) into \( \mathbb{R} \).

(9) In the vector space \( \mathbb{R}^3 \) the Euclidean distance function obeys the triangle inequality.

(10) A line in the vector space \( \mathbb{R}^2 \) is a subset of \( \mathbb{R}^2 \).

(11) A half-space in the vector space \( \mathbb{R}^2 \) is a subset of \( \mathbb{R}^2 \).

(12) An angle between two vectors in the vector space \( \mathbb{R}^2 \) is a subset of \( \mathbb{R}^2 \).

(13) The additive inverse of a vector in an abstract vector space is unique.

(14) The additive identity in an abstract vector space is unique.
(15) A vector space can consist of just one element.

(16) Let $V$ denote an inner-product space defined over the scalar field, $\mathbb{R}$. If $V$ has at least two elements then there exist an infinite number of inner products on $V$.

(17) An inner product on a vector space induces a norm on the vector space.

(18) It is always possible to define a norm on a vector space.

(19) It is possible to define, in a meaningful way, the notion of an angle between two non-zero vectors in an inner-product space.

(20) A norm defined on a vector space, $V$, is a function from $V \times V$ into $\mathbb{R}$.

(21) A norm defined on a vector space, $V$, is a function from $V$ into $V$.

(22) The real numbers can be thought of as a vector space over $\mathbb{R}$.

(23) The rational numbers can be thought of as a vector space over $\mathbb{R}$.

(24) The rational numbers can be thought of as a vector space over the field of rational numbers.