Practice 2

Question 1. Fill in each blank with a suitable word. Some words are given in the following box.

> **bases / basis / centre / circle / closed / combinations / converse / diameter / does not / equal / finite / formulated / infinitely / infinite-dimensional / lies / lying / mutually / not / perpendicular / radius / subfield / state**

a) There exists only one plane passing through any three points . . . . lying on the same straight line.

b) The Pythagorean theorem is . . . . as follows: The square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the other two sides. The theorem . . . . to the Pythagorean theorem is also true: If the square of a side of a triangle is equal to the sum of the squares of the other two sides, then that triangle is right-angled.

c) The equation of the . . . . in Cartesian coordinates is $(x - a)^2 + (y - b)^2 = R^2$, where a and b are the coordinates of the . . . .

d) A segment joining the centre of the circle to any point on it (as well as the length of this segment) is called a . . . .

e) A straight line passing through two points of the circle is called a secant; the segment of it which lies within the circle is called a chord. Chords which are equidistant from the centre are . . . . A chord passing through the centre of the circle is called its . . . . The diameter . . . . to a chord divides it in half.

f) A straight line a and a plane (P) are said to be . . . . perpendicular if a is perpendicular to any straight line . . . . in (P).

g) A . . . . of a field K is a subset $\subset$ K which itself is a field under the operations of addition and multiplication defined in K.

h) A vector subspace, or simply a subspace, of a vector space V is a subset $W \subset V$ that is . . . . with respect to the operations of addition and multiplication by a scalar.

i) The set of all linear . . . . of vectors of the set M is the smallest subspace containing M.

j) All . . . . of a given vector space have the same cardinality, which is known as the dimension of the vector space. If this cardinality is . . . . , the space is said to be finite-dimensional; otherwise it is known as an . . . . vector space.

Question 2. Translate the following paragraphs into Vietnamese.

a) The class of functions consisting of the polynomials, the exponential functions, the logarithmic functions, the trigonometric functions, the inverse trigonometric functions, and the functions obtained from those listed by the four arithmetic operations and by superposition (formation of a composite function), applied finitely many times. The class of elementary functions is very well studied and occurs most frequently in mathematics. However, many problems lead to the examination of functions that are not elementary. The derivative of an elementary function is also elementary; the indefinite integral of an elementary function cannot always be expressed in terms of elementary functions. In the study of non-elementary functions one tries to represent these in terms of elementary functions by means of infinite series or products, etc.

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b) A vector space over a field K is a set V of elements (called vectors) in which the operations of addition of vectors and multiplication of a vector by elements of K are specified and satisfy a number of axioms. One of the most important concepts in the theory of vector spaces is that of a linear mapping, that is, a homomorphism of vector spaces over the same field. A linear operator, or linear transformation, is a linear mapping of the space into itself. If the space V is finite dimensional, then by choosing a basis $e_1, e_2, \ldots, e_n$ in V and putting

$$T(e_j) = \sum_{i=1}^{n} a_{ij} e_i, j = 1, 2, \ldots, n,$$

one obtains a square matrix $A = (a_{ij})$ of order n, which is called the matrix of the linear transformation T in the given basis.

A vector space V over a field K endowed with an additional operation of multiplication of vectors satisfying certain axioms, is called an algebra over K.

All linear transformations of a space V with respect to the naturally defined operations of addition, multiplication and multiplication of linear transformations by elements of K form an algebra over K. All square matrices of fixed order with elements from K also form an algebra over K. The correspondence mentioned above between linear transformations of a space V and their matrices in a given basis is an isomorphism of these algebras, which makes it possible to formulate theorems about linear transformations in the language of matrices and to use the theory of matrices in proving them.

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Question 3. Translate the following sentences/paragraphs into English.

a) Đường kính là dây cung đi qua tâm của đường tròn; nó cũng là dây cung có độ dài lớn nhất.

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b) Hai đường thẳng phân biệt cùng nằm trong một mặt phẳng mà không song song thì cắt nhau.

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c) Trung tuyến đi qua trung điểm của cạnh huyền của một tam giác vuông có độ dài bằng một nửa cạnh huyền đó.

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d) Đường thẳng a tiếp xúc với đường tròn (C) nếu khoảng cách từ tâm của (C) đến a bằng bán kính của (C).

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e) Diện tích của đường tròn bằng π lần bình phương bán kính.

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f) Trong một tam giác nhọn, tổng bình phương của hai cạnh lớn hơn bình phương của cạnh còn lại.

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g) Trong mặt phẳng Oxy, tìm tọa độ các đỉnh của tam giác ABC biết rằng đường thẳng AB, đường cao kẻ từ A và đường trung tuyến kẻ từ B lần lượt có phương trình $x + 4y - 2 = 0$, $2x - 3y + 7 = 0$, $2x + 3y - 9 = 0$.

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