

Calculus II 第十二章quiz 5

考点:向量, 直线方程和平面方程

1. Multiple Choice Questions:

(1) (2019年期中) Let \vec{a} and \vec{b} be two nonzero orthogonal vectors, which of the following must be true? (A) $|\vec{a} + \vec{b}| = |\vec{a}| + |\vec{b}|$; (B) $|\vec{a} - \vec{b}| = |\vec{a}| - |\vec{b}|$; (C) $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$; (D) $\vec{a} + \vec{b} = \vec{a} - \vec{b}$ C

(2) (2019年期中) The equations of two lines are $l_1 : x = t, y = 2t, z = -t$, and $l_2 : x = 1 - 2t, y = t, z = -1 + t$. Then l_1 and l_2 are D

(A) parallel; (B) orthogonal; (C) intersect with each other; (D) skew.

(3) (2021年期中) Identify the surface of $2x^2 + y^2 = z^2$. B

~~(A) Hyperboloid of two sheets;~~ (B) Elliptical Cone;
~~(C) Hyperboloid of one sheet;~~ (D) Elliptical paraboloid.

2. Determine whether the following statements are true or false? No justification is necessary.

(1) (2020年期末) If $\vec{u} \neq 0$, and if $\vec{u} \times \vec{v} = \vec{u} \times \vec{w}$ and $\vec{u} \cdot \vec{v} = \vec{u} \cdot \vec{w}$, then $\vec{v} = \vec{w}$. True

(2) (2019年期末) The plane $x + y - 2z = 1$ is perpendicular to the plane $x + y + z = 1$. True
 $(1, 1, -2)$ $(1, 1, 1)$

3. Please fill in the blank for the questions below.

(1) (2021年期中) If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors and $\vec{a} + \vec{b} + \vec{c} = 0$, then $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a} = \underline{-\frac{3}{2}}$

(2) (2021年期中) If the vector \vec{c} is perpendicular to $\vec{a} = (1, 2, 1)$ and $\vec{b} = (-1, 1, 1)$ and $\vec{c} \cdot (\vec{i} - 2\vec{j} + \vec{k}) = 16$, then $\vec{c} = \underline{(2, -4, 6)}$ $(2, 1, -1)$

(3) (2020年期末) The equation of the plane through the line $x = -1 + 2t, y = 3 + t, z = -t$ and parallel to the line $x = -2t, y = t, z = 1 - t$ is $\underline{2x + y - z = 1}$ $x + by + cz = 0$
 $(-2, 1, -1)$

4. (2022年期末) Find the equation for the plane through the origin parallel to the following lines: $l_1 : x = 1, y = -1 + t, z = 2 + t$, and $l_2 : x = -1 + t, y = -2 + 2t, z = 1 + t$. $x - y + z = 0$
 $(0, 1, 1)$ $(1, 2, 1)$

5. (2021年期末) Find the equation of the plane through point $(1, 0, 1)$, and perpendicular to the plane $x - 2y + 3z + 2 = 0$ and the plane $x + 2y - 3z - 2 = 0$. $3y + 2z = 2$
 $(1, -2, 3)$ $(1, 2, -3)$

6. (2019年期中) Find the equation of the plane through the points $(2, -1, -1)$ and $(1, 0, -1)$ perpendicular to the plane $2x + 3y - 5z + 6 = 0$. $x + y + z = 0$