MATH 20C

Assignment

TUTOR: JannLeo

TUTOR: 刘俊楠

本科深圳大学计算机科学与技术，硕士利兹大学Embedded System Engineering，GPA均前5%并获得优秀毕业生（一等一），擅长计算机、电子等专业。逻辑清晰，语言精准。

擅长科目：

Data Comms& Ntwk Security、FPGA Design Syst Chip、Control Systems Design、Emb Microprocessor Syst Design、Programming、JAVA程序设计、离散数学、数据库系统、数据结构与算法、专业基础英语、计算机安全导论、操作系统、并行计算、多媒体系统导论、计算机系统、自动机与形式语言、程序设计基础、概率论与数理统计、高等数学A、线性代数、面向对象程序设计、计算机网络、算法设计与分析、专业研究英语

教学风格：轻松愉快

1

学情交流

2 本课信息

3 知识分析

知识分析

Find the components of the vector $\overrightarrow{PQ} = \langle x, y \rangle$ if $P = (-4, 3)$ and $Q = (8, 5)$.

(Give your answers as a whole or exact number.)

$x =$ 12

Correct Answer

$y =$ 2

Correct Answer

知识分析

Let $\mathbf{v} = \overrightarrow{PQ}$, where $P = (1, 3)$ and $Q = (8, 10)$. What is the head of the vector $\mathbf{v}'$ equivalent to $\mathbf{v}$ based at $(6, 4)$? What is the head of the vector $\mathbf{v_0}$ equivalent to $\mathbf{v}$ based at the origin?

(Give your answer in the form (*,*). Express numbers in exact form. Use symbolic notation and fractions where needed.)

coordinates of the head of $\mathbf{v}'$: (13,11)

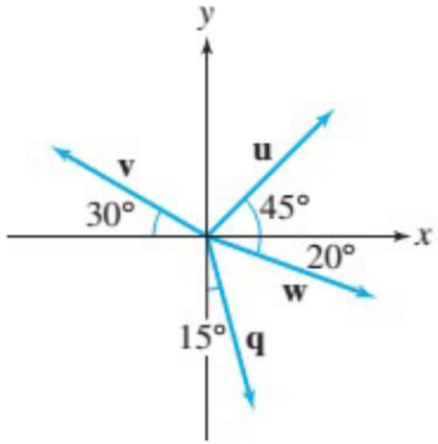
Correct Answer

coordinates of the head of $\mathbf{v_0}$: (7,7)

Correct Answer

知识分析

Refer to the figure.



Find the components of **v**.

(Use symbolic notation and fractions where needed. Give your answers in radians.)

$v_1 = \|\mathbf{v}\| \cdot$ $-\frac{\sqrt{3}}{2}$

Correct Answer

$v_2 = \|\mathbf{v}\| \cdot$ 0.5

Correct Answer

知识分析

Let $\mathbf{v} = \langle 7, 4 \rangle$. Which of the following vectors are parallel to $\mathbf{v}$ and which point in the same direction?

(a) $\langle 42, -24 \rangle$

- ○ Parallel to $\mathbf{v}$ and points in the same direction.
- ◉ Not parallel to $\mathbf{v}$.
- ○ Parallel to $\mathbf{v}$ and points in the opposite direction.

Correct Answer

(b) $\langle 28, 16 \rangle$

- ◉ Parallel to $\mathbf{v}$ and points in the same direction.
- ○ Not parallel to $\mathbf{v}$.
- ○ Parallel to $\mathbf{v}$ and points in opposite direction.

Correct Answer

(c) $\langle -28, -16 \rangle$

- ○ Parallel to $\mathbf{v}$ and points in the same direction.
- ○ Not parallel to $\mathbf{v}$.
- ◉ Parallel to $\mathbf{v}$ and points in opposite direction.

知识分析

Let $R = (-10, 1)$. Calculate the point Q such that $\overrightarrow{RQ}$ has components $\langle 19, 10 \rangle$.

(Use symbolic notation and fractions where needed.)

x-coordinate: 9

Correct Answer

y-coordinate: 11

Correct Answer

知识分析

Find the vector $\mathbf{w}$ of length 5 in the direction of $\mathbf{v} = 11\mathbf{i} + 3\mathbf{j}$.

(Give your answer using component form or standard basis vectors. Express numbers in exact form. Use symbolic notation and fractions where needed.)

$$\mathbf{w} = \left\langle \frac{55}{\sqrt{130}}, \frac{15}{\sqrt{130}} \right\rangle$$

Correct Answer

知识分析

Suppose that $ABCD$ is a parallelogram, and $A = (-7, 6)$, $B = (-6, b)$, $C = (-4, 7)$, $D = (a, 3)$.

What are the coordinates a and b?

(Use symbolic notation and fractions where needed.)

$a =$ -5

Correct Answer

$b =$ 10

Correct Answer

知识分析

Express $\mathbf{u} = \langle 8, 25 \rangle$ as a linear combination $\mathbf{u} = r\mathbf{v} + s\mathbf{w}$, where $\mathbf{v} = \langle 3, 9 \rangle$ and $\mathbf{w} = \langle 4, 13 \rangle$.

(Use symbolic notation and fractions where needed.)

$r =$ $\frac{4}{3}$

Correct Answer

$s =$ 1

Correct Answer

知识分析

Let $\mathbf{v} = \langle 5, 5, 6 \rangle$.

Which of the following vectors is parallel to $\mathbf{v}$?

- ○ $\langle -10, 10, -12 \rangle$
- ◉ $\langle -15, -15, -18 \rangle$
- ○ $\langle 20, -15, -12 \rangle$
- ○ $\langle 11, 7, 9 \rangle$

Correct Answer

Which of the following vectors points in the same direction as $\mathbf{v}$ and is parallel to $\mathbf{v}$?

- ○ $\langle -15, -15, -18 \rangle$
- ○ $\langle -11, 7, -9 \rangle$
- ◉ $\langle 10, 10, 12 \rangle$
- ○ $\langle -20, -15, -12 \rangle$

Correct Answer

知识分析

Calculate the linear combination.

$$7(4\mathbf{j} + 2\mathbf{k}) - 5(2\mathbf{i} + 7\mathbf{k}) = \langle x, y, z \rangle$$

(Give an exact answer.)

$x =$ -10

Correct Answer

$y =$ 28

Correct Answer

$z =$ -21

Correct Answer

知识分析

Find the unit vector $\mathbf{e_v}$, where $\mathbf{v} = \langle 5, 0, 6 \rangle$.

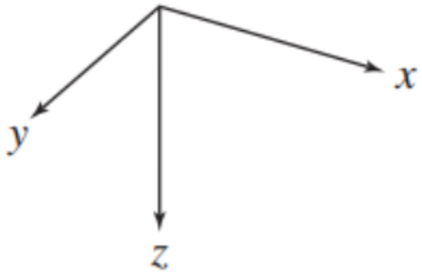
(Give your answer using component form or standard basis vectors. Express numbers in exact form. Use symbolic notation and fractions where needed.)

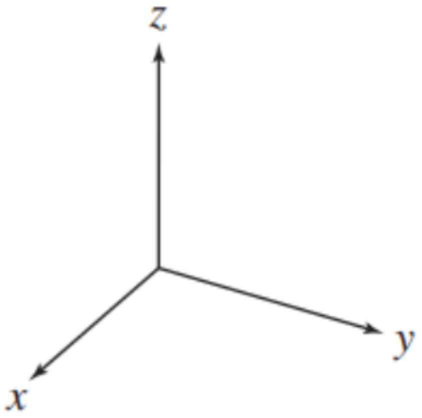
$$\mathbf{e_v} = \left\langle \frac{5}{\sqrt{61}}, 0, \frac{6}{\sqrt{61}} \right\rangle$$

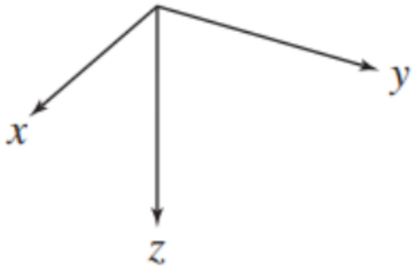
Correct Answer

知识分析

Determine which coordinate systems satisfy the Right-Hand Rule.

- [x] 

- [x] 

- [ ] 

知识分析

Evaluate $\overrightarrow{AB}$ and $\overrightarrow{PQ}$, where

$$A = (2, 2, 0),\ B = (4, 4, 5),\ P = (2, -9, -8), \text{ and } Q = (4, -7, -2)$$

(Give your answer using component form or standard basis vectors. Express numbers in exact form. Use symbolic notation and fractions where needed.)

$\overrightarrow{AB} =$ $\langle 2,2,5 \rangle$

Correct Answer

$\overrightarrow{PQ} =$ $\langle 2,2,6 \rangle$

Correct Answer

Are $\overrightarrow{AB}$ and $\overrightarrow{PQ}$ equivalent vectors?

- (●) No, the vectors are not equivalent.
- ( ) Yes, the vectors are equivalent.

Correct Answer

知识分析

Give an equation for the sphere with diameter \\(\overline{PQ}\text{,} \\) where \\(P = (1, 1,−7) \\) \\(\text{and }Q = (1, 5, 1)\text{.}\\)

(Express numbers in exact form. Use symbolic notation and fractions where needed.)

equation: $(x-1)^2+(y-3)^2+(z+3)^2=20$

Correct Answer

知识分析

Consider the point $P = (6, 6, 10)$ and the vector $\mathbf{v} = \langle 3, -4, -4 \rangle$.

Which of the following is a vector parametrization for the line passing through P with the direction vector $\mathbf{v}$?

- $\langle 6 + 3t, 6 - 4t, 10 - 4t \rangle$
- $\langle 3 + 6t, -4 + 6t, -4 + 10t \rangle$
- $\langle 18, -24, -40 \rangle$
- $\langle 3t, -4t, -4t \rangle$

Correct Answer

知识分析

Find parametric equations of the line perpendicular to the yz-plane passing through the point $(1, -2, 9)$.

(Use symbolic notation and fractions where needed. Choose the positive unit direction vector.)

$x =$ $1+t$

Correct Answer

$y =$ -2

Correct Answer

$z =$ 9

Correct Answer

知识分析

Find parametric equations for the line passing through $(0, 0, 4)$ and parallel to the line passing through $(3, 4, 3)$ and $(-1, 2, -2)$.

(Use symbolic notation and fractions where needed.)

$x =$ $-4t$

Correct Answer

$y =$ $-2t$

Correct Answer

$z =$ $4 - 5t$

Correct Answer

知识分析

Find the vector parametrization $\mathbf{r}(t)$ of the line $\mathcal{L}$ that passes through the points $(3, 1, 2)$ and $(8, 6, 4)$.

(Give your answer in the form $\langle *, *, * \rangle$. Express numbers in exact form. Use symbolic notation and fractions where needed.)

$\mathbf{r}(t) =$ $\langle 3 + 5t, 1 + 5t, 2 + 2t \rangle$

Correct Answer

知识分析

Let $\mathbf{r_1}(t) = \langle -6, 10, -4\rangle + t\langle 0, 4, 1\rangle$ and $\mathbf{r_2}(s) = \langle 0, -2, -13\rangle + s\langle 3, 0, -3\rangle$. Find the point of intersection, P, of the two lines $\mathbf{r_1}$ and $\mathbf{r_2}$.

$P =$ (−6,−2,−7)

Correct Answer

知识分析

A laser beam shines along the ray given by $\mathbf{r_1}(t) = \langle 5, 1, 7\rangle + t\langle 5, 3, -2\rangle$ for $t \geq 0$.

The second laser beam shines along the ray given by $\mathbf{r_2}(s) = \langle 7, 2, -2\rangle + s\langle -2, 2, c\rangle$ for $s \geq 0$, where the value of c allows for the adjustment of the z-coordinate of its direction vector.

Find the value of c that will make the two beams intersect.

(Use symbolic notation and fractions where needed.)

$c =$ 132

Correct Answer

知识分析

WEEK 3 ASSIGNMENT

知识分析

Compute the dot product.

(Give an exact answer. Use symbolic notation and fractions where needed.)

$(6\mathbf{j} + 6\mathbf{k}) \cdot (\mathbf{i} - 4\mathbf{j}) =$ -24

Correct Answer

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

知识分析

Write the equation of the plane with normal vector $\mathbf{n} = \mathbf{i} - \mathbf{k}$ passing through the point $(6, 1, -8)$ in the scalar form $ax + by + cz = d$.

(Express numbers in exact form. Use symbolic notation and fractions where needed. Give the equation in scalar form in terms of x, y, and z.)

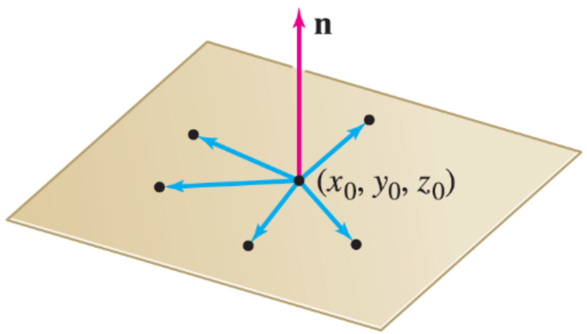
equation:

知识分析

Geometric Description of a Plane

The plane $\mathcal{P}$ through $P_0 = (x_0, y_0, z_0)$ with normal vector $\mathbf{n} = \langle a, b, c \rangle$ consists of the tips of all vectors based at P_0 that are perpendicular to $\mathbf{n}$ (Figure 2).

平面通过正常矢量通过垂直于垂直于的所有向量的尖端组成（图2）。



Rogawski et al., *Calculus: Early Transcendentals*, 4e, © 2019 W. H. Freeman and Company

FIGURE 2 图2

This geometric description indicates that the plane $\mathcal{P}$ is the set of $P = (x, y, z)$ such that $\mathbf{n} \cdot \overrightarrow{P_0 P} = 0$. This equation of the plane is equivalent to each of the following versions:

该几何描述表明平面是一个集合，因此该平面的等式等效于以下每个版本：

$$\langle a, b, c\rangle \cdot \langle x - x_0, y - y_0, z - z_0\rangle = 0$$
$$a(x - x_0) + b(y - y_0) + c(z - z_0) = 0$$
$$ax + by + cz = ax_0 + by_0 + cz_0$$
$$\mathbf{n} \cdot \langle x, y, z\rangle = ax_0 + by_0 + cz_0$$

知识分析

Find the equation of the plane that passes through $(15, 9, 10)$ and is parallel to $x + y + z = 3$.

(Express numbers in exact form. Use symbolic notation and fractions where needed.)

equation of the plane:

知识分析

Find an equation of the plane passing through the three points given

$$P = (7, 2, 1),\ Q = (10, 7, 8),\ R = (14, 6, 2)$$

(Use symbolic notation and fractions where needed. Give you answer in the form $ax + by + cz = d$.)

equation of the plane:

知识分析

In each case, determine whether or not the lines have a single point of intersection. If they do, give an equation of a plane containing them.

a) $\mathbf{r_1} = \langle 5t, 2t-1, 2t-2 \rangle$ and $\mathbf{r_2} = \langle t-7, -t+6, t-9 \rangle$

b) $\mathbf{r_1} = \langle 4t, -4t+1, t-5 \rangle$ and $\mathbf{r_2} = \langle 2t-3, -t, -t-1 \rangle$

(Express numbers in exact form. Use symbolic notation and fractions where needed. Enter DNE if lines do not intersect.)

(a) the equation of the plane:

(b) the equation of the plane:

知识分析

(a) Determine if the lines are distinct parallel lines, skew, or the same line.

$$\mathbf{r}_1(t) = \langle 3t + 5, -3t - 5, 4t - 6 \rangle$$
$$\mathbf{r}_2(t) = \langle 11 - 6t, 6t - 11, 2 - 8t \rangle$$

Choose the correct answer.

- ○ The lines are the same line.
- ○ The lines are parallel.
- ○ The lines are skew.

知识分析

(b) Determine if the lines are distinct parallel lines. If they are, find an equation of the plane containing the lines. If they are not distinct parallel lines, enter DNE.

$$\mathbf{r}_1(t) = \langle -9t, 3t + 1, 9t + 5 \rangle$$
$$\mathbf{r}_2(t) = \langle 3t - 3, -t + 4, 5 - 3t \rangle$$

(Express numbers in exact form. Use symbolic notation and fractions where needed. Give the equation in terms of x, y, and z.)

知识分析

Determine the equation of the plane containing the point and the line.

$$(-7, 10, -3), \quad \mathbf{r}(t) = \langle 1 - 4t, 6t - 8, t - 4 \rangle$$

(Express numbers in exact form. Use symbolic notation and fractions where needed. Write the equation of the plane in scalar form in terms of x, y, and z.)

equation:

Identify which points lie on the line $\mathbf{r}$.

- ☐ $(-7, 4, -2)$
- ☐ $(5, -14, -5)$
- ☐ $(1, 10, -1)$
- ☐ $(9, -20, -7)$
- ☐ $(5, 7, -2)$

知识分析

Find the intersection of the line $\mathbf{r}(t) = \langle 1, 0, -1\rangle + t\langle 4, 13, 2\rangle$ and the plane $x - z = 6$.

(Give your answer in the form (*,*,*). Express numbers in exact form. Use symbolic notation and fractions where needed.)

intersection point:

知识分析

Find parametric equations for the line through $P_0 = (8, -1, 1)$ perpendicular to the plane $4x + 12y - 3z = 14$.

$$x = 8 + 4t$$

(Express numbers in exact form. Use symbolic notation and fractions where needed.)

$y =$

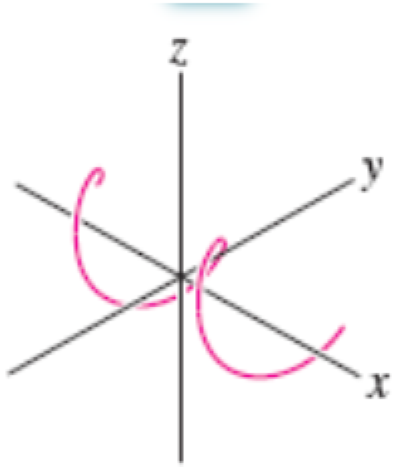
$z =$

知识分析

The plane $\frac{x}{2}+\frac{y}{4}+\frac{z}{7}=1$ intersects the x-, y-, and z-axes in points P, Q, R. Find the area of the triangle ΔPQR.

$S_{\Delta PQR}=$ ______

知识分析



Match the space curve with the vector-valued function in the figure.

- $\mathbf{r}(t) = \langle t, \cos(t), \sin(t) \rangle$
- $\mathbf{r}(t) = \langle \cos(t), \cos(t), \sin(t) \rangle$
- $\mathbf{r}(t) = \langle 1, t, t \rangle$

知识分析

The function $\mathbf{r}(t) = \langle 8,\ 2 + 5\cos(7t),\ 3 + 5\sin(7t)\rangle$ traces a circle. Determine the radius, center, and plane containing the circle.

(Use symbolic notation and fractions where needed.)

radius:

(Use symbolic notation and fractions where needed. Give your answer as the coordinates of a point in the form $(*, *, *)$.)

center:

The circle lies in the plane

- $y = 8$
- $x = 8$
- $z = 8$

知识分析

Parametrize the intersection of the surfaces $y^2 - z^2 = x - 4$, $y^2 + z^2 = 25$ using trigonometric functions.

(Express numbers in exact form. Use symbolic notation and fractions where needed. Give the parametrization of the y variable in the form $a\cos(t)$.)

$x(t) =$

$y(t) =$

$z(t) =$

知识分析

Parametrize the intersection of the surfaces $x^2 + y^2 = z^2,\ 6y = z^2$ using $t = z$ as parameter.

(Use symbolic notation and fractions where needed.

$x(t) = \pm$ ______

$y(t) =$ ______

$z(t) =$ ______

知识分析

Select the correct sine and cosine parametrization $\mathbf{r}(t)$ of the intersection of the surfaces

$$x^2 + y^2 = 9$$

$$z = 4x^2$$

The parametrization is

- $\mathbf{r}(t) = \langle 9\cos(t), 9\sin(t), 36\cos^2(t)\rangle$
- $\mathbf{r}(t) = \langle 9\cos(t), 9\sin(t), 9\cos^2(t)\rangle$
- $\mathbf{r}(t) = \langle 36\cos(t), 36\sin(t), 36\cos^2(t)\rangle$
- $\mathbf{r}(t) = \langle 3\cos(t), 3\sin(t), 9\cos^2(t)\rangle$
- $\mathbf{r}(t) = \langle 3\cos(t), 3\sin(t), 36\cos^2(t)\rangle$

知识分析

Determine whether the two paths $\mathbf{r}_1(t)$ and $\mathbf{r}_2(t)$ collide or intersect.

$$\mathbf{r}_1 = \langle t, t^2, t^3 \rangle$$

$$\mathbf{r}_2 = \left\langle 4t - 29, \frac{1}{9}t^2, 27 \right\rangle$$

The two paths

- ○ do not collide
- ○ collide

and

- ○ do not intersect.
- ○ intersect.

知识分析

The intersection of the plane $y = 4$ with the sphere $x^2 + y^2 + z^2 = 65$.

Select the correct parametrization $\mathbf{r}(t)$ of the curve.

- ○ $\mathbf{r}(t) = \langle \cos(t), 4, \sin(t) \rangle$
- ○ $\mathbf{r}(t) = \langle 65\cos(t), 4, 65\sin(t) \rangle$
- ○ $\mathbf{r}(t) = \langle 7\cos(t), 7, 7\sin(t) \rangle$
- ○ $\mathbf{r}(t) = \langle 7\cos(t), 4, 7\sin(t) \rangle$
- ○ $\mathbf{r}(t) = \langle 49\cos(t), 4, 49\sin(t) \rangle$

知识分析

Evaluate the limit for $\mathbf{r}(t) = \left\langle t^{-5}, \sin(t), -3 \right\rangle$.

$$\lim_{h\to 0} \frac{\mathbf{r}(t+h) - \mathbf{r}(t)}{h} = \langle f(t), g(t), h(t) \rangle$$

(Use symbolic notation and fractions where needed.)

$f(t) =$

$g(t) =$

$h(t) =$

知识分析

Let $\mathbf{r} = \left\langle e^{8t-5}, e^{3-12t}, (t+1)^{-7} \right\rangle$.

Compute the derivative.

(Use symbolic notation and fractions where needed. Give your answer in the form $\langle x(t), y(t), z(t) \rangle$.)

$$\frac{d\mathbf{r}}{dt} = $$

知识分析

Compute the derivative $\frac{d}{dt}(\mathbf{r}_1(t) \cdot \mathbf{r}_2(t))$ if

$$\mathbf{r}_1(t) = \left\langle t^{10}, t^3, t^9 \right\rangle$$

$$\mathbf{r}_2(t) = \left\langle e^{7t}, e^{3t}, e^{10t} \right\rangle$$

(Use symbolic notation and fractions where needed.)

$$\frac{d}{dt}(\mathbf{r}_1(t) \cdot \mathbf{r}_2(t)) =$$

知识分析

Evaluate the derivative by using the appropriate Product Rule where $\mathbf{r}_1(t) = \left\langle t^2, t^3, 8t \right\rangle$, $\mathbf{r}(2) = \langle 2, 1, 0 \rangle$, and $\mathbf{r}'(2) = \langle 1, 4, 3 \rangle$.

(Give an exact answer. Use symbolic notation and fractions where needed.)

$$\frac{d}{dt}(\mathbf{r}(t) \cdot \mathbf{r}_1(t))\Big|_{t=2} =$$

知识分析

Let

$$\mathbf{r}(t) = \langle t^6, t^6 \rangle$$

$$g(t) = \sin(4t)$$

Evaluate the derivative using the Chain Rule.

(Use symbolic notation and fractions where needed. Give your answer in the form $\langle x(t), y(t) \rangle$.)

$$\frac{d}{dt}\mathbf{r}(g(t)) =$$

知识分析

Find an equation of the tangent line $y(x)$ of $\mathbf{r}(t) = \langle t^6, t^5 \rangle$ at the point $t = 1$.

(Use symbolic notation and fractions where needed.)

$y(x) =$

知识分析

Find a parametrization of the tangent line to $\mathbf{r}(t) = (\ln(t))\mathbf{i} + t^{-4}\mathbf{j} + 14t\mathbf{k}$ at the point $t = 1$.

(Use symbolic notation and fractions where needed. Give your answer in the form $\langle x(t), y(t), z(t)\rangle$.)

$\mathcal{L}(t) =$

6 课后作业

课后作业

1. 复习期末考试卷