WebAssign

Hw 1 (12.1-12.4): Vectors and Geometry of Space (Homework)

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1. 1.25/1.25 points | Previous Answers

SCalcET7 12.1.012.

Find an equation of the sphere with center (4, -7, 3) and radius 5.



Use an equation to describe its intersection with each of the coordinate planes. (If the sphere does not intersect with the plane, enter DNE.)

intersection with xy-plane

intersection with xz-plane

intersection with yz-plane



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2. 1.25/1.25 points | Previous Answers

SCalcET7 12.1.017.

Write the equation of the sphere in standard form.

$$2x^2 + 2y^2 + 2z^2 = 12x - 20z + 1$$



Find its center and radius.

center
$$(x, y, z) = ($$



radius

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3. 1.25/1.25 points | Previous Answers

SCalcET7 12.1.035.

Write an inequality to describe the region.

The region between the yz-plane and the vertical plane x = 6

- $0 < x^2 + v^2 + z^2 <$ 6
- \bullet 0 < x < 6
- 0 < z < 6
- 0 < y < 6
- none of these

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SCalcET7 12.1.036.

Write an inequality to describe the region.

The solid cylinder that lies on or below the plane z = 7 and on or above the disk in the xyplane with center the origin and radius 5

- $x^2 + y^2 \le 5, 0 \le z \le 7$
- $x^2 + y^2 \le 25, 0 \le z \le 7$
- $x^2 + y^2 + z^2 \le 7, 0 \le z \le 5$
 - $x^2 + y^2 + z^2 \le 25, 0 \le z \le$
- none of these

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SCalcET7 12.2.019.

Find
$$\mathbf{a} + \mathbf{b}$$
, $2\mathbf{a} + 3\mathbf{b}$, $|\mathbf{a}|$, and $|\mathbf{a} - \mathbf{b}|$.

$$\mathbf{a} = \langle 3, -4 \rangle, \quad \mathbf{b} = \langle -5, 2 \rangle$$



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a + b =

2a + 3b =



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|a| =

 $|\mathbf{a} - \mathbf{b}| =$



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SCalcET7 12.2.024.

Find a unit vector that has the same direction as the given vector.

(-8, 4, 8)



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SCalcET7 12.2.026.

Find a vector that has the same direction as $\langle -2, 4, 2 \rangle$ but has length 6.



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SCalcET7 12.3.020.

Find the angle between the vectors. (First find an exact expression and then approximate to the nearest degree.)

$$a = i + 2i - 2k$$
, $b = 8i - 6k$

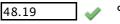


exact

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SCalcET7 12.3.023.

Determine whether the given vectors are orthogonal, parallel, or neither.

- (a) $\mathbf{a} = \langle -6, 3, 6 \rangle, \quad \mathbf{b} = \langle 6, -6, 1 \rangle$
- orthogonal
- parallel
- neither

✓

- (b) $\mathbf{a} = \langle 6, 6 \rangle, \quad \mathbf{b} = \langle -3, 3 \rangle$
- orthogonal
- parallel
- neither

•

- (c) $\mathbf{a} = -\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}, \quad \mathbf{b} = 4\mathbf{i} + 3\mathbf{j} \mathbf{k}$
- orthogonal
- parallel
- neither

(d) $\mathbf{a} = 4\mathbf{i} + 2\mathbf{j} - 2\mathbf{k}, \quad \mathbf{b} = -6\mathbf{i} - 3\mathbf{j} + 3\mathbf{k}$

- orthogonal
- parallel
- neither

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SCalcET7 12.3.025.

Use vectors to decide whether the triangle with vertices

P(-1, -1, -3), Q(0, 2, -5), and R(4, 0, -6) is right-angled.

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Yes, it is right-angled.

No, it is not right-angled.



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SCalcET7 12.3.028.

Find two unit vectors that make an angle of 60° with $\mathbf{v} = \langle 4, 3 \rangle$. (Enter your answer as a commaseparated list of vectors. Round your answers to four decimal places.)



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SCalcET7 12.4.003.

Find the cross product $\mathbf{a} \times \mathbf{b}$.

$$a = i + 4j - 2k$$
, $b = -i + 4k$



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Verify that it is orthogonal to both **a** and **b**.

$$(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{a} = 0$$

$$(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{b} = \boxed{0}$$

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SCalcET7 12.4.019.

Find two unit vectors orthogonal to both (7, 5, 1) and (-1, 1, 0).



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(smaller i-value)



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(larger i-value)



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SCalcET7 12.4.027.

Find the area of the parallelogram with vertices A(-4, 4), B(-2, 7), C(2, 5), and D(0, 2).



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SCalcET7 12.4.032.

Consider the points below.

$$P(-1, 4, 1), Q(0, 6, 3), R(5, 3, -1)$$

- (a) Find a nonzero vector orthogonal to the plane through the points P, Q, and R.
 - \mathcal{A}
- (b) Find the area of the triangle PQR.

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SCalcET7 12.4.033.

Find the volume of the parallelepiped determined by the vectors ${\bf a}$, ${\bf b}$, and ${\bf c}$.

$$\mathbf{a} = \langle 1, 4, 2 \rangle, \quad \mathbf{b} = \langle -1, 1, 2 \rangle, \quad \mathbf{c} = \langle 4, 1, 5 \rangle$$

45 cubic units

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