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1. (1 point)
Find two unit vectors orthogonal to $\mathbf{a} = \langle 0,2,0\rangle$ and $\mathbf{b} = \langle 1,0,1\rangle$
Enter your answer so that the first vector has a positive first coordinate

First Vector: $\langle$______, ______, ______$\rangle$

Second Vector: $\langle$______, ______, ______$\rangle$

Answer(s) submitted:

- `2/sqrt(8)`
- `0`
- `-2/sqrt(8)`
- `-2/sqrt(8)`
- `0`
- `2/sqrt(8)`

(correct)

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2. (1 point) Find the cross product $\mathbf{a}\times\mathbf{b}$ where $\mathbf{a} = \langle 1,-3,3\rangle$ and $\mathbf{b} = \langle 5,-5,2\rangle$.
$\mathbf{a}\times\mathbf{b} =$ ______
Find the cross product $\mathbf{c}\times\mathbf{d}$ where $\mathbf{c} = \langle 5,0,1\rangle$ and $\mathbf{d} = \langle 0,-4,-4\rangle$.
$\mathbf{c}\times\mathbf{d} =$ ______
Entering-Vectors.html
Answer(s) submitted:

- `<9,13,10>`
- `<4, 20, -20>`

(correct)

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3. (1 point) Find the area of the triangle with vertices $(0,0,0), (-1,-3,5)$, and $(-1,-4,7)$.

$A =$ ______
Answer(s) submitted:

- `sqrt(6)/2`

(correct)

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4. (1 point) Find the volume of the parallelepiped with one vertex at $(-2,-5,-2)$, and adjacent vertices at $(-3,0,-7)$, $(4,-3,5)$, and $(-9,-10,-1)$.

Volume = ______.
Answer(s) submitted:

- `232`

(correct)

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5. (1 point) Use the geometric definition of the cross product and the properties of the cross product to make the following calculations.

(a) $((\vec{i}+\vec{j})\times\vec{i})\times\vec{j} =$ ______

(b) $(\vec{j}+\vec{k})\times(\vec{j}\times\vec{k}) =$ ______

(c) $4\vec{i}\times(\vec{i}+\vec{j}) =$ ______

(d) $(\vec{k}+\vec{j})\times(\vec{k}-\vec{j}) =$ ______
Answer(s) submitted:

- `i`
- `j-k`
- `4k`
- `2i`

(correct)

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7. (1 point) Find a vector equation for the line through the point P = (-4, 3, -3) and parallel to the vector **v** = (-2, -4, 1).
Assume $\mathbf{r}(0) = -4\mathbf{i}+3\mathbf{j}-3\mathbf{k}$ and that **v** is the velocity vector of the line..
$\mathbf{r}(t)$ = ____ **i** + ____ **j** + ____ **k**
Rewrite this in terms of the parametric equations for the line.
x = ____
y = ____
z = ____
Answer(s) submitted:

- `-2t-4`
- `-4t+3`
- `t-3`
- `-4-2t`
- `3-4t`
- `-3+t`

(correct)

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8. (1 point)
Find the vector and parametric equations for the line through the point P(0, 2, 3) and parallel to the vector $1\mathbf{i}-2\mathbf{j}-1\mathbf{k}$.
Vector Form: $\mathbf{r} = \langle$____, ____, 3 $\rangle + t\langle$ ____, ____, -1 $\rangle$
Parametric form (parameter t, and passing through P when t = 0):
$x = x(t) =$ ______
$y = y(t) =$ ______
$z = z(t) =$ ______

Answer(s) submitted:

- `0`
- `2`
- `1`

- -2
- t
- 2-2t
- 3-t

(correct)

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9. (1 point)
Find the point at which the line $\vec{r} = \langle 1,-2,1\rangle + t\langle -1,-1,2\rangle$ intersects the plane $-5x-5y+4z = 171$.

(_________, _________, _________)

Answer(s) submitted:

- -8
- -11
- 19

(correct)

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12. (1 point) Consider the planes given by the equations

$$y-2x-2z = 3,$$

$$x-2y+3z = 7.$$

(a) Find a vector $\vec{v}$ parallel to the line of intersection of the planes.
$\vec{v} =$ ____________________

(b) Find the equation of a plane through the origin which is perpendicular to the line of intersection of these two planes.
This plane is ________________________

Answer(s) submitted:

- <-1, 4, 3>
- -x+4y+3z=0

(correct)

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13. (1 point) Let $P = (1,0,0), Q = (1,1,-1), R = (-2,-1,1)$. Find

(a) The area of the triangle PQR.
area = ____________________

(b) The equation for a plane that contains P, Q, and R.
This plane is ____________________

Answer(s) submitted:

- sqrt(18)/2
- 3y+3z=0

(correct)

---

14. (1 point) Find an equation for the plane through the points $(3,5,5), (2,1,0), (-2,0,-1)$.
The plane is ________________________

Answer(s) submitted:

- -x+19y-15z-17= 0

(correct)

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15. (1 point)
Find the vector and parametric equations for the line through the point P(2, 3, -4) and orthogonal to the plane $2x+2y+1z = -4$.

Vector Form: $\mathbf{r} = \langle$ ____, ____, -4 $\rangle + t\langle$ ____, ____, 1 $\rangle$

Parametric form (parameter t, and passing through P when t = 0):
$x = x(t) =$ ______________
$y = y(t) =$ ______________
$z = z(t) =$ ______________

Answer(s) submitted:

- 2
- 3
- 2
- 2
- 2t + 2
- 2t + 3
- t - 4

(correct)

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17. (1 point)
Find the vector equation for the line of intersection of the planes $3x+y+3z = -1$ and $3x+z = 0$

$\mathbf{r} = \langle$ ____, ____,0 $\rangle + t\langle 1,$ ____, ____ $\rangle$.

Answer(s) submitted:

- 0
- -1
- 6
- -3

(correct)

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18. (1 point)
Find the distance from the point (0, 4, -5) to the plane $4x-5y+3z = 7$.

____

Answer(s) submitted:

- 42/sqrt(50)

(correct)

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19. (1 point) Find the distance from the point (3, 5, 1) to the line $x = 0, \quad y = 5+t, \quad z = 1+5t$.

____

Answer(s) submitted:

- 3

(correct)

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21. (1 point) Find the linear equation of the plane through the point $(2,7,8)$ and parallel to the plane $x+3y+6z+4 = 0$.
Equation: ________________

Answer(s) submitted:

- x+3y+6z-71=0

(correct)

23. (1 point) Find a vector equation with parameter t for the line through the points $(-1,-7,-4)$ and $(-14,5,4)$.

Answer: $\mathbf{r}(t) =$ ______

Answer(s) submitted:

- `<-1, -7,-4> +t<-13, 12, 8>`

(correct)

24. (1 point) The two vectors $\overline{u} = \langle 3,1,-2\rangle$ and $\overline{v} = \langle -3,2,0\rangle$ determine a plane in space. Mark each of the vectors below as "**T**" if the vector lies in the same plane as $\overline{u}$ and "**F**" if not.

___ 1. $\langle 9,-6,0\rangle$
___ 2. $\langle -9,3,2\rangle$
___ 3. $\langle -1,-2,2\rangle$
___ 4. $\langle -2,3,0\rangle$

Answer(s) submitted:

- `T`
- `T`
- `F`
- `F`

(correct)

26. (1 point)

Find an equation of the plane consisting of all points that are equidistant from (-1, 2, 0) and (0, 3, 2).

______

Note: you have to enter the full equation.

Answer(s) submitted:

- `x+y+2z=4`

(correct)

27. (1 point) Find the angle in radians between the planes $4x+z=1$ and $5y+z=1$.

______

Answer(s) submitted:

- `cos^(-1)(1/sqrt(442))`

(correct)