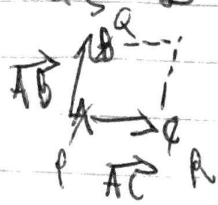
What is Component Form: This is $\langle a, b \rangle$

c_1 c_2

the components give info regarding vector direction & magnitude.

How to find a vector orthogonal to a plane with certain points: First define the plane as 2 different vectors



the result can be negative or positive, cause negatively and positively the vector remains orthogonal

find direction vector of $\vec{PQ}$ and $\vec{PR}$, Then take the cross ($\times$) product of the two vectors $\vec{PQ}$ $\vec{PR}$, then the resulting direction vector is orthogonal to plane

$$\begin{vmatrix} i & j & k & i & j \\ & PQ & & & \\ & PR & & & \end{vmatrix} = \vec{PQ} \times \vec{PR}$$

if you are given 2 vectors and one of their components contain an unkown "a" you can use the dot product, set result equal to zero followed by isolating a for your answer

Force = Torque $\cdot$ Sin(theta) / 4 * 10^-9

distance between point & origin

H.W. 3

*Parametric Equations in three dimensions are used to represent a line or a curve

How to find Parametric Equations of lines going through certain points.

Find the direction Vector of those two points followed by using one of the points for the constant of parametric equation

one of points ↓ $\langle c_1, c_2, c_3 \rangle$

$x(t) = c_1 + \boxed{a}t$ direction vector points
$y(t) = c_2 + \boxed{b}t$
$z(t) = c_3 + \boxed{c}t$

How to find the intersection of a plane and a line

- x(t)
- y(t)
- z(t)

1. Find parametric equations
2. Substitute parametric equations into line
3. isolate your t
4. use t-value to extract the point of intersection ~~written~~ from parametric equations with substitution

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How find a point in which a line intersects a plane: use the idea that

xy-plane: z=0

xz-plane: y=0

yz-plane: x=0

1. depending on plane set the whole thing = to zero and isolate t.

2. then, get you point of intersection by substituting your t-value to each parametric equation

How to find Vector Parallel to the line defined by parametric equations: 1. just signify your point is the constants of parametric equations

Scalar 2 $2\langle 5,6,4\rangle \leftarrow \langle 5,6,4\rangle$ original

2. and a scalar of your t slopes are ultimate going to make a parrallel line

parallel

$\langle 10,18,6\rangle$

$x(t)=5t$
$y(t)=-5+6t$
$z(t)=-3+4t$

point $=(0,-5,-3)$

How to find the point for which a line defined by a parametric equation intersects with a plane: Set $y=0$, solve for t, substitute in

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How to find parametric Equations of 2 planes intersecting:

So your equation results should give you $(a,0,b)$

only do parametric equations we know set 0

Use Standard Equation of a plane

$$a(x-x_1)+b(y-y_1)+c(z-z_1)=0$$

$\begin{vmatrix} i & j & k & i & j \end{vmatrix}$

1.) cross 2 equation vectors to get coefficients → a, b, c.

Constants

t-slope

the points

2.) set: into a system solve by setting

3. the sub the shift in

The components within points represent x, y & z

then, isolate list of variables

* you can use the equation of a plane to give you the t-values (slope of parametric equations) and you can use th point the line passes through for your constants being either added/subtracted

How to find a plane through a point that is orthogonal to a line:

just substitute values of standard equation of line.

1. your $x_1\, y_1\, \&\, z_1$ is your point

2. your a, b, c is your t vector values or in parametric equation t values for equations

3. Sub those shits in standard plane

$$a(x-x_1)+b(y-y_1)+c(z-z_1)=0$$

How to find a plane that contains a line and is orthogonal to a plane:

1. identify your point as line constants

2. find the cross product of your vector t-values and orthogonal coefficients which are also t-values

3. the sub resulting coefficient into standard plane a, b, c and point for $x_1\, y_1\, z_1$

Then done

How to find a plane containing a point and a line of intersection of the plane are equal to 2 equations:

1. Create a linear system of equations with 2 planes

2. Find 2 different points by making 1 zero & solving for the rest. do this 2 times which should give you found (a, b, 0)

(0, b, c)

3. Then find ~~[illegible]~~ the direction vector of the point given an points found which should give you 2 vectors

4. Then you do your cross product with both vectors to ~~[illegible]~~ find the normal vector

5. Sub point given and normal vector found into plane equation and you're set.

Just means make a function with just x, y in standard equation

if you need to find this $f(x,y)$

1. Just cross product direction 2 vectors

2. put ur points in any of the three and isolate z

3.

How to find an acute angle between planes:

norms are just coefficient of vectors

Angle Between 2 Planes

$$\cos\theta = \frac{|n_1 \cdot n_2|}{\|n_1\| \|n_2\|}$$

How to find the distance from a point to a line:

1. Solve for t in your equation

$$(\langle \ \rangle + \langle \ \rangle t) - (\langle a, b, c \rangle)$$

line — point given

☆ if ~~won't go~~ remove common denom $\langle$ numerator's vector $\rangle$

2. the plug t into your parametric equation to get new vector

3. • common denom

find the direction of given point and new vector

~~[illegible]~~ new - given

$\sqrt{2}$ $\quad 1, 1, 5$

4. then find magnitude/Norm