MA153 Lesson 4

LESSON 4 - Equations of Lines and Planes

Wednesday, 27 August, 2008

Outline

1. Admin
2. Last Class
   - Do Problem Help
3. Equations of Lines and Planes
   - Course Guide
   - Parametric Equations and Equation of a Line
   - Planes
4. Look Forward

Admin

1. Schedule an interview - Use outlook! - Populate your calendar.

Admin

2. Homework 1 is due 2 September in class - The assignment is posted on the web site

Admin

3. No Class on Friday! We have a drop! Don't show up to this class!

Admin

4. Do the Mathematica Tutorial by COB Thursday 28 August 2008. Email me your code before you head to the game Friday - This is worth 5 points, similar to a quiz.

Dot and Cross Product

Questions?

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Objectives

Equations of Lines and Planes (Stewart 12.5)

1. Use vector, scalar, and symmetric equations to express a line.
2. Use vectors to parameterize a line segment between two points.
3. Use vector, scalar, and linear equations to express a plane.
4. Determine the angle between two intersecting planes.
5. Determine the point of intersection of a line and a plane.
6. Determine the equation for the line of intersection of two planes.
7. Determine the distance from a point to a plane.
8. Determine the distance between two parallel planes.

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Definitions

1. $\overrightarrow{r} = \overrightarrow{r_0} + t\overrightarrow{v}$
2. $x = x_0 + at \quad y = y_0 + bt \quad z = z_0 + ct$
3. $\dfrac{x - x_0}{a} = \dfrac{y - y_0}{b} = \dfrac{z - z_0}{c}$
4. Line Segment from $\overrightarrow{r_0}$ to $\overrightarrow{r_1}$ is given by the vector equation

$$\overrightarrow{r}(t) = (1 - t)\overrightarrow{r_0} + t\overrightarrow{r_1}$$

Board Work

1. Page 802 - Problem 3
2. Page 802 - Problem 4
3. Page 802 - Problem 14

Power Point, not Power Point

Power Point version of equation of a line

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Definitions

1. Definition 5: Vector equation of the plane

Definitions

1. Definition 5: Vector equation of the plane $\mathbf{n} \cdot (\mathbf{r} - \mathbf{r}_0)$

Definitions

2. Definition 6: Another vector equation of the plane

Definitions

2. Definition 6: Another vector equation of the plane $\mathbf{n} \cdot \mathbf{r} = \mathbf{n} \cdot \mathbf{r}_0$

Definitions

3 Definition 7: Scaler equation of the plane

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   1. if $\mathbf{n}$ is a vector perpendicular to the plane given by $\mathbf{n} = \langle a, b, c \rangle$
   2. and the points $\mathbf{r} = \langle x, y, z \rangle$, and $\mathbf{r}_0 = \langle x_0, y_0, z_0 \rangle$

Definitions

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   2. and the points $\mathbf{r} = \langle x, y, z \rangle$, and $\mathbf{r}_0 = \langle x_0, y_0, z_0 \rangle$
   3. Then the equation is $\langle a, b, c \rangle \cdot \langle x - x_0, y - y_0, z - z_0 \rangle = 0$

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   1. if $\mathbf{n}$ is a vector perpendicular to the plane given by $\mathbf{n} = \langle a, b, c \rangle$
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   3. Then the equation is $\langle a, b, c \rangle \cdot \langle x - x_0, y - y_0, z - z_0 \rangle = 0$
   4. Or $a(x - x_0) + b(y - y_0) + c(z - z_0) = 0$

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Homework Help

Homework Help - 12.5 (5, 10, 24, 40, 49, 69)

Look Forward

Cylinders and Quadric Surfaces (Stewart 12.6)

1. Understand how cylinders are three-dimensional extensions of curves in two variables.
2. Understand how quadric surfaces are the graphs of second-degree polynomials in , y,x and z.

Questions?

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