MA104 Lesson 36

LESSON 36 - Equations of Planes in Space

Wednesday, 26 March, 2008

Outline

1. Admin
2. Last Class
3. EQUATIONS OF PLANES IN SPACE
   - Course Guide
   - Definitions
   - Do Problem Help
4. Look Forward - Vector Functions and Their Derivatives

Admin

1. Turn in homework II/III today!

Equation of Lines in Space

Questions?

Outline

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4 Look Forward - Vector Functions and Their Derivatives

Objectives

1. Understand how to develop the vector and scalar equations of a plane in space using vectors.
2. Develop an equation of a plane in space given either a point on the plane and a vector normal to the plane, or three points on the plane that do not lie on the same line.

READ

1. Stewart: Section 12.5, pages 797-801 (Start at Planes).

THINK ABOUT

1. What is characteristic of the intersection between two planes in space?

DO Problems

1. Section 12.5/ 5, 23, 29, 31, 35

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Explanations

1. Going back to vectors - A vector has:

Explanations

1. Going back to vectors - A vector has:
    1. Magnitude

Explanations

1. Going back to vectors - A vector has:
    1. Magnitude
    2. Direction

Explanations

2. A plane has:

Explanations

2. A plane has:
    1. A vector, perpendicular to the plane

Explanations

2. A plane has:
    1. A vector, perpendicular to the plane
    2. A point in the plane

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

Definitions

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   1. if $\mathbf{n}$ is a vector perpendicular to the plane given by

Definitions

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3. Definition 7: Scaler equation of the plane
   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

3. Definition 7: Scaler equation of the plane
   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 $\mathbf{r}_0 = \langle x_0, y_0, z_0 \rangle$
   3. Then the equation is $\langle a, b, c \rangle \cdot \langle x - x_0, y - y_0, z - z_0 \rangle = 0$

Definitions

3. Definition 7: Scaler equation of the plane
   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 $\mathbf{r}_0 = \langle x_0, y_0, z_0 \rangle$
   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 $a(x - x_0) + b(y - y_0) + c(z - z_0) = 0$

Power Point, not Power Point

Power Point version of equation of a plane

Major DeGregory's Worksheet

Go with what looks good and makes sense to me

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4 Look Forward - Vector Functions and Their Derivatives

1. Section 12.5/ 5, 23, 29, 31, 35

LESSON 37 - Vector Functions and Their Derivatives

1. OBJECTIVES:
   1. Understand the definition of a vector function and be able to find the domain of a vector function.
   2. Understand how to calculate rates of change for vector functions.
   3. Understand the physical interpretation of the derivative of a vector function.
2. READ:
   1. Stewart: Section 13.1, pages 817-822.
   2. Stewart: Section 13.2, pages 824-827 (Stop at Integrals).
   3. Student Notes.
3. THINK ABOUT:
   1. How are vector functions related to parametric equations?
4. DO:
   1. Section 13.1/ 2, 9, 15, 19, 20, 24
   2. Section 13.2/ 3, 8, 9, 13, 23

Questions?

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