MA104 Lesson 38

LESSON 38 - VECTOR FUNCTIONS AND THEIR DERIVATIVES

Friday, 28 March, 2008

Outline

1. Admin
2. Last Class
3. VECTOR FUNCTIONS AND THEIR DERIVATIVES
   - Course Guide
   - Vector Functions
   - Vector Function Derivatives
   - Do Problem Help
4. Board Problems
5. Look Forward - PROJECTILE MOTION I

Admin

1. Quiz - You will have 10 minutes only.

Admin

1. Quiz - You will have 10 minutes only.
2. Whose Birthday is it?

EQUATIONS OF PLANES IN SPACE

Questions?

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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.

READ

1. Stewart: Section 13.1, pages 817-822.
2. Stewart: Section 13.2, pages 824-827 (Stop at Integrals).
3. Student Notes.

THINK ABOUT

1. How are vector functions related to parametric equations?

DO Problems

1. Section 13.1/ 2, 9, 15, 19, 20, 24
2. Section 13.2/ 3, 8, 9, 13, 23

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Explanations

1. Going back to parametric equations:

Explanations

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   1. A parametric equation was described as $[x = f(t), y = g(t)]$

Explanations

1. Going back to parametric equations:
   1. A parametric equation was described as $[x = f(t), y = g(t)]$
   2. A parametric equation describes how x and y changed with respect to the independent variable.

Explanations

2 Vector Functions:

Explanations

2. Vector Functions:
   1. A Vector Function just describes the components of a vector as functions of the independent variable.

Explanations

2. Vector Functions:
   1. A Vector Function just describes the components of a vector as functions of the independent variable.
   2. We usually describe a vector function in the following way $\mathbf{r}(t) = \langle f(t), g(t), h(t) \rangle = f(t)\mathbf{i} + g(t)\mathbf{j} + h(t)\mathbf{k}$

Examples and Do Problem Help

1. Mathematica Examples
2. Section 13.1/ 2, 9, 15, 19, 20, 24

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Derivatives of Vector Functions

1. The derivative of a vector function is the derivative of its components.
2. The derivative describes the tangent of the given curve.
3. Review the Differential Rules on Page 826.

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1. Section 13.2/ 3, 8, 9, 13, 23

The Slingshot

LESSON 39 - PROJECTILE MOTION I

1. OBJECTIVES:
   1. Understand the relationship between the position, velocity, and acceleration vectors for an objects' motion in space.
   2. Find the velocity and acceleration vectors when given the position vector and an initial condition.
   3. Be able to use the parametric equations of motion in order to solve projectile motion problems.
2. READ:
   1. Stewart: Section 13.4, pages 838-842 (Stop at Tangential and Normal Components of Acceleration).
   2. Student Notes.
3. THINK ABOUT:
   1. What does the magnitude of the velocity vector represent?
   2. What assumptions are made in the book when solving projectile motion problems?
4. DO:
   1. Section 13.4/ 3, 5, 10, 13, 23

Questions?

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