MA104 Lesson 30

LESSON 30 - MATHEMATICAL DIMENSIONS

Tuesday, 04 March, 2008

Outline

1. Admin
2. Last Class
3. Mathematical Dimensions
   - Course Guide
   - Three Dimensional Room
   - Three Dimensional Example
   - Do Problem Help
   - Neat Examples
4. Look Forward - INTRODUCTION TO VECTOR AND VECTOR OPERATIONS
   - Course Guide

Admin

1. Bridge Building day on Friday.
2. http://bridgecontest.usma.edu/

PARAMETRIC EQUATIONS II: INTERSECTION AND COLLISION

Questions?

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Objectives

1. Understand the 3-D coordinate system and identify the coordinate planes within the system.
2. Determine the distance between points in 3 dimensional space.
3. Understand how to project a point onto a plane.

READ

1. Stewart: Section 12.1, pages 765-768.

THINK ABOUT

1. See if you can derive the distance formula on page 767 (look at Figure 9).

DO Problems

1. Section 12.1/ 3, 4, 6, 8, 10

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This room in three dimensions

Think of this room as it is, Three Dimensional!
Break the building into octants.
Where is the xy plane, yz plane, and the xz plane?

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What is the Equation of a Line?
It is the set of all points (x, y) that satisfy the equation.

This room in three dimensions

Think of this room as it is, Three Dimensional!
Break the building into octants.
Where is the xy plane, yz plane, and the xz plane?
What is the Equation of a Line?
It is the set of all points (x, y) that satisfy the equation.
The same is true in 3D it is the set of points (x, y, z) that satisfy an equation of a sphere or some other 3D object.

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Tossing a Grenade

1. One of your soldiers tosses a grenade from the second floor of a building at a position of $(8, 9, 10)$ (dimensions in yards) with his target an enemy hide site at the origin (0,0,0) across an intersection. The grenade's burst radius is 13 yard.

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2. Model the burst radius.

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4. If you move into a building across the street at the same height as your soldier are you still safe?

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2. Model the burst radius.
3. Is your soldier a safe distance from the grenade
4. If you move into a building across the street at the same height as your soldier are you still safe?
5. Now your radio doesn't work if you were to throw a rock back to your soldier how far would you have to throw it?

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Section 12.1/ 3, 4, 6, 8, 10

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Cool Examples

1. Tribute to Sean Taylor
   - Another look at Sean Taylor's hit
2. Our Collision from yesterday.

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LESSON 31 - INTRODUCTION TO VECTOR AND VECTOR OPERATIONS

1. OBJECTIVES:
   1. Understand what a vector is and the properties of vectors given on page 774.
   2. Understand vector addition, subtraction, and scalar multiplication algebraically, physically, and graphically.
   3. Understand what a unit vector is and how to calculate the unit vector for any given vector.
   4. Understand how vectors can be used to describe several forces acting on an object, and how the resultant force is the sum of these vectors.
   5. Determine a vector between two points.
2. READ:
   1. Stewart: Section 12.2, pages 770-776.
3. THINK ABOUT:
   1. What is a unit vector?
   2. What information can a unit vector relate?
4. DO:
   1. Section 12.2/ 4, 7, 9, 15, 19, 22, 24, 26

Questions?

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