Assignment

Read: Section 11.1, 11.2 – Vectors in the Plane and in 3-space

Lesson 2 in Study Guide

We will introduce 2 and 3-dimensional vectors at the same time .

Try:
§11.1 17 - 35 odd numbered, 39, 45, 51
§11.2 11, 13, 19, 23, 27, 29, 31, 33, 37, 39, 45, 47
Start work on assignments 3 and 4 on MyMathLab

Vectors

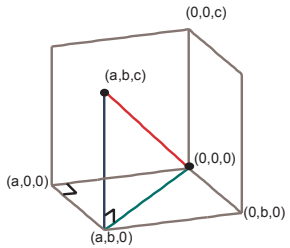
- Informally:
  – magnitude and direction
  – directed line segment.
- Formally: **a 2-dimensional vector** is an ordered pair $\mathbf{a} = \langle a_1, a_2 \rangle$ of real numbers.
- A **3-dimensional vector** is an ordered triple $\mathbf{a} = \langle a_1, a_2, a_3 \rangle$ of real numbers.

Examples:

Terminology, Length of a vector

- representation of a vector
- position vector of $P(a, b, c)$
- vector with representation $\overrightarrow{AB}$
- 0 vector, $\mathbf{0}$

Def. The length of a vector $\mathbf{v} = \langle a, b, c \rangle$ is $\sqrt{a^2 + b^2 + c^2}$



Vector Addition and Scalar Mult.

Def. (Vector Addition):

$$\langle a_1, a_2, a_3 \rangle + \langle b_1, b_2, b_3 \rangle \equiv \langle a_1 + b_1, a_2 + b_2, a_3 + b_3 \rangle$$

Graphical Interpretation:
(Triangle Law or Parallelogram Law)

Def: Scalar Multiplication

$$c \langle a_1, a_2, a_3 \rangle \equiv \langle c \cdot a_1, c \cdot a_2, c \cdot a_3 \rangle$$

Properties of Vectors

Def: V_n is the set of n-dimensional vectors,

$$\{\langle a_1, a_2, a_3, \cdots, a_n\rangle \,|a_i \in R\}$$

Def: $-\mathbf{a} \equiv -1 \cdot \mathbf{a}$

Properties of Vectors
Read in text

Equations of Balls and Spheres

Standard basis vectors

Def. $\mathbf{i} = \langle 1, 0, 0\rangle$, $\mathbf{j} = \langle 0, 1, 0\rangle$, $\mathbf{k} = \langle 0, 0, 1\rangle$

Note:
Every vector can be written as a *linear combination* of the standard basis vectors.

Terminology:
unit vector unit vector in direction of $\mathbf{a}$
Resultant Force

Examples

- $\mathbf{a} + \mathbf{b} = \mathbf{b} + \mathbf{a}$
- $\mathbf{a} + (\mathbf{b} + \mathbf{c}) = (\mathbf{a} + \mathbf{b}) + \mathbf{c}$
- $\mathbf{a} + \mathbf{0} = \mathbf{a}$
- $\mathbf{a} + (-\mathbf{a}) = \mathbf{0}$
- $c(\mathbf{a} + \mathbf{b}) = c\mathbf{a} + c\mathbf{b}$
- $(c + d)\mathbf{a} = c\mathbf{a} + d\mathbf{a}$
- $(cd)\mathbf{a} = c(d\mathbf{a})$
- $1\mathbf{a} = \mathbf{a}$