Math2310 - Fall '22

Syllabus - Lecture 05

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Review

- Vector addition as translation
- Checking that the cross product is orthogonal to all vectors
- The norm and spheres [1] [optional: i]
- Linearity of signed area [Linearity of signed area in 2D - GeoGebra]

Topics

1 Cylinders and Quadric Surfaces

not covered in class

Independent reading, no need to study the surfaces but look at the pictures and recognize them

2 Vector functions and space curves [2,3]

- `defn` Vector functions of one real variable
- `defn` Intuitive understanding of continuity
- Relation with parameterized sets
  - non-uniqueness of parameterization [4]
- Describing paths:
  - representation in geogebra
  - algebraic operations
- polar coordinates [5]

2.1 Digression: orthonormal bases [ii]

- The standard orthonormal basis $\hat{e}_i$
- Components w.r.t to a different orthonormal basis

References

Videos

1. Equation of a sphere, plus center and radius (KristaKingMath) - YouTube

2. Curves, Parameterizations, and the Arclength Parameterization - YouTube (stop at Arclength - not inclusive)

3. Parametric curves | Multivariable calculus | Khan Academy - YouTube

4. Parametrization - Example 1 - YouTube

5. Intro to Polar Coordinates - YouTube

6. Graphing a Parametric Equation Using GeoGebra Classic 5 - YouTube

Textbook

- [Ste] Chap 12.6 Cylinders and Quadric Surfaces (overview)
- [Ste] Chap 10.1 Curves Defined by Parametric Equations (complete, prereq)
- [Ste] Chap 10.3 Polar Coordinates (complete, prereq)
- [Ste] Chap 13.1 Vector Functions and Space Curves (complete)
- [Ste] Chap 13.2 Derivatives and Integrals of Vector Functions pp898-pp900 (stop at differentiation rules)

Additional material

i. Multivariable Calculus | The equation of a sphere. - YouTube

ii. Coordinates with respect to orthonormal bases | Linear Algebra | Khan Academy - YouTube