

# LINEAR ALGEBRA AND VECTOR ANALYSIS

MATH 22A

## Unit 13: Keywords for First Hourly

### Theorems

- Cauchy-Schwarz
- Pythagoras
- Al Khashi
- Uniqueness of Row reduction
- The cross product formula
- Image of transpose is perpendicular to kernel of matrix.
- Cauchy Binet formula
- For differentiable curves, arc length exists.
- The equivalence of curvature formulas
- Euler formula and special case
- Distortion formula in space

### Algorithms

- Find angle between vectors
- Find area of parallelogram
- Find volume of parallelepiped
- Row reduce a matrix
- Get position from acceleration
- Find vector perpendicular to a plane
- Find length of a curve or matrix
- Find curvature at some point
- Compute with complex numbers
- Switch between coordinate systems
- Compute the distortion factor
- Get distances between objects

### Objects

- Matrices
- Vectors
- Curves
- Linear manifolds
- Quadratic manifolds
- Kernel of map

Parametrized surfaces

### Differentiation

- Velocity
- Acceleration
- The Frenet TNB frame
- Jacobian matrix
- Curvature

### Integration

- Integrate to get arc length.
- Integrate to get position from velocity etc.
- Integration technique: substitution
- Integration technique: partial fractions
- Integration technique: simplification

### Coordinate systems

- Cartesian coordinates
- Polar coordinates
- Cylindrical coordinates
- Spherical coordinates
- General coordinate change

### Parametrized Surfaces

- Spheres
- Surfaces of revolution
- Graphs
- Planes

### People

- Mandelbrot
- Hamilton
- Descartes
- Cauchy
- Binet
- Schwarz
- Euler
- Heine
- Cantor
- Bolzano
- Archimedes
- Newton