CSE 3380: Linear Algebra for CSE
University of Texas at Arlington
Spring 2023
Alex Dillhoff

Exam 2 Review

Topics

1. The Determinant
   (a) Outcomes
      - Compute the determinant of a matrix using cofactor expansion.
      - Compute determinants using a few operations as possible.
      - Be familiar with how row operations affect the determinant.
      - Understand the relationship in operations between det A^T and det A.
   (b) Assignments
      - Assignment 4
   (c) Problems
      - Section 3.1 #9-14, 19-30
      - Section 3.2 #1-10, 15-26
2. Linear Transformations and Computer Graphics
   (a) Outcomes
      - Know the definition of a linear transformation.
      - Identify the difference between an affine transformation and linear transformation.
      - Apply basic linear transformations (rotation and scaling).
      - Apply affine transformations (translation).
      - Derive a projection matrix given a plane and camera coordinates.
   (b) Assignments
      - Assignment 4
   (c) Problems
      - Section 1.8 #1-8, 13-16, 19-30
      - Section 2.7 #1-8, 11, 12
3. Determinants and Volume
   (a) Outcomes
      - Understand what the determinant of a linear transformation says about the space it is applied to.

- Calculate the volume of an object transformed by some linear transformation.

(b) Problems

- Section 3.3 #19-31, 35, 36

4. Coordinate Systems, Change of Basis

(a) Outcomes

- Define a coordinate system for a given vector space V.
- Derive a change-of-coordinates matrix between $\mathbb{R}^n$ and a vector space V.
- Derive a change-of-coordinates matrix between two coordinate systems of a vector space V.

(b) Assignments

- Assignments 4 and 5

(c) Problems

- Section 4.4 #1-12, 15-20
- Section 4.6 #1-14

5. Orthgonality

(a) Outcomes

- Know the definition and how to test for orthogonality.
- Calculate the vector norm.
- Find the distance between two vectors.
- Know how to identify an orthogonal basis.
- Be able to describe an orthogonal projection geometrically.

(b) Assignments

- Assignment 5

(c) Problems

- Section 6.1 #1-18
- Section 6.2 #1-12
- Section 6.3 #3-18