

## **MATH 1080: Spring 2011**

### Midterm Exam I Review Topics

Chapters: I.1-2, II.6-8, 10-11

#### Theory:

- Definition and properties of scalar & outer products
- Definition and properties of an orthogonal matrix
- Definition and properties of the Euclidean norm (Cauchy Schwartz inequality)
- Definition and properties of a projector
- Definition and properties of an orthogonal projector
- Definition of the full and reduced QR factorization.
- Definition and properties of the Householder reflector.

#### Methods

- Computation of inner and outer products
- Characterization of an orthogonal matrix as a transformation (rotation, reflection, etc.).
- Computation of an orthogonal projector onto a specified range.
- Computation of reduced or full QR factorization by Gram-Schmidt orthogonalization
- Computation of full QR factorization by Householder algorithm.
- Finding orthogonal basis for a specified linear vector space.
- Solving a linear system using QR decomposition.
- Least-squares minimization.
- Determination of the operation count in a given algorithm.