Computing for Math and Stats

Lecture 3

Vectors

- Vectors and matrices is what Matlab is designed to handle
- Vectors can be 2-D, 3-D but also higher dimensionality
- Mathematicians, scientists and engineers often use high dimensionality vectors/matrices, sometimes with infinite number of dimensions
- Matlab can only represent finite dimensionality vectors/matrices explicitly

Vectors

- The elements of the vector can be given in square brackets (commas optional)
  - Vec1 = [1, 2, 3, 4, 15]
- The first element can be accessed as
  - Vec1(1)
- Or
  - Indx=1;
  - Vec1(Indx)

Row Vector vs Column Vector

- The above was a row vector
- We can define column vectors as well
  - Usually when it is not stated explicitly in a modern textbook it is a column vector (at least in engineering)
- Here is one:
  - Vec2 = [1; 2; 3; 4; 15]

Vectors

- Very often we need to create a simple vector to test some code.
- To create a vector with 2, 3, 4, 5 (brackets optional)
  - Vec3 = [2:5]
  - Vec3 = linspace(2,5,4)
  - Vec3 = [2:1:5]
- The colon means ..
  - Vec3(2:3)
- Notice the vector access is round (not square) brackets

Matrices

- Similar deal
  - Mat1 = [1, 2, 3; 4, 5, 6; 7, 8, 9]
  - Mat2 = [1:3;4:6;7:9]
  - Mat4 = zeros(3,3)
  - Mat5 = eye(3)
- We also have the transpose operator
  - Mat1'

Creating Symmetric Matrices

- A symmetric matrix is identical to its transpose
- To make a symmetric matrix out of a non symmetric one we add to it its transpose
- A+A’ is symmetric
- (A+A’)/2 is the symmetric part of A
- A*A’ is symmetric too.
  - This is used in least squares calculations
- See checksymmetric.m script.
  - Also checkcom.m

Creating a Skew Symmetric

- A skew symmetric matrix is the opposite of its transpose (their sum is the zero matrix)
- We create one my subtracting from it its transpose
- A-A’ is skew symmetric
- (A-A’)/2 is the skew symmetric part of a matrix
  - Every matrix is the sum of its symmetric and skew symmetric parts.

Checking for Equality

- We often need to check if two numbers/vectors/ matrices are equal
- The standard method is to subtract the two quantities and see if the result is zero.
- Question: how do you check two 1000x1000 matrices for equality?
- Answer: you do not! Use the norm function.