Midterm topics to review

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1 Matlab commands

- plot()
- subplot()
- the . operator
- the $*$ operator
- the ^ operator
- the : operator
- the left matrix divide lmdivide
- shading interp
- colormap()
- pcolor
- surf
- meshgrid
- mean()
- median()
- std()
- corrcoef()

- cov()
- whos
- clear
- load
- save
- matlab .mat files, ASCII files, tabular data
- matlab functions
- making a comment (the percent sign operator)
- the transpose operator (')
- tic and toc command

2 Topics

- What is modeling and why do we do it?
- The difference between the model and reality
- Greek letters and mathematical symbols (don't try to memorize EVERYTHING, but it wouldn't hurt to know or have written down those items we've used so far or discussed in class)
- Scalars
- Vectors (column vectors and row vectors)
- Matrices
- Summation ($\sum$)
- Product ($\prod$)
- Transpose of a matrix
- Matrix addition/subtraction/multiplication/etc
- special matrices - identity matrix, zeros, diagonal matrices

- data files (ASCII, binary, text)
- analog vs. digital signals
- discrete vs. continuous signals
- aliasing
- filtering (low pass/high pass)
- two specific low pass filters (moving average 'box' filter, recursive filter), causality issues for each filter
- high pass filter from low pass
- domain and range of a function
- sampling frequency
- resolution
- digital precision
- nyquist frequency
- nyquist rate
- AC/DC components of a signal (not the band)
- what is data visualization?
- color space (RGB, CMY, HSV)
- luminance equation
- false color representation
- colormaps
- color gamuts
- redundant encoding of information
- Supersampling/subsampling
- Hertz
- mean, median, mode, standard deviation, covariance, correlation, variance, trace

- the normal distribution, skew, etc
- linear least squares
- nonlinear least squares
- correlation coefficient
- least square error
- solving Ax=b (conceptually, not specific steps)
- Inverse of a matrix (qualitative, anything presented)
- interpolation and extrapolation (LERP, SLERP, BERP, TERP, lagrange)

3 Source material

Focus on topics mentioned in class (ie if there is a massive reading, questions may come from that reading, but topics will be relevant to the lecture)

- Lecture slides up through Thursday Oct 26, 2006
- Lecture notes up through Thursday Oct 26, 2006
- Homeworks up through homework 3 material
- handouts from the handouts section
- Readings up through homework 3 reading
- Discussion Section main topics up through Friday Oct 27, 2006