Cogsci 109 Midterm topics to review (Suggestions - this is not an exhaustive list, but main topics)

C. Alex Simpkins

November 3, 2007

1 Matlab commands

- plot()
- subplot()
- the . operator
- the $*$ operator
- theˆoperator
- 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 EVERY-THING, 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 Monday Nov 5, 2007

- Lecture notes up through Monday Nov 5, 2007

- Homeworks up through homework 4 material (see homework assignment)

- handouts from the handouts section

- Readings up through homework 4 reading

- Discussion Section main topics up through Friday Nov 2, 2007