

# Math 210 Study Guide - Midterm 1

This is an incomplete list of topics, based on the homework already given in class.

## Perl and HTML

- Day of the Week problem - loops and HTML incorporation
- Monte Carlo problem - random variables
- Making triangles - random variables

## Probability

- “Inverse Probability”: Flipping coins, birthday problem, copier code problem
- Conditional Probability: House Alarm, Smoking Students, Power Black-out
- Genetic relations: to whom are you more related?

## Weighted Averages

- $p_1 \dots p_{48}$  with weighted coefficients
- Scoring Tests and Test Averages

## Expected Value and Standard Deviation

- Dartboard problem - use summation, not integral
- Bus Problem - use integral, not summation (modular function)
- Coffee Shop Problem - use summation, not integral (not a modular function)

## Markov Matrices and Matrix Manipulations

- Limp Bizkit and Limousines - Simple Markov Matrix Problem - Illustration of when to use Markov matrices
- Rats in a Maze Problem - More Complex Matrix Problem - Illustration of when not to use Markov matrices and instead just use expected value
- Matrix transformations - changing shape of  $F$ . No vector addition if  $T(0) = 0$ , but necessary if  $T(0) \neq 0$ .

## Least Squares

- Linearize the variables (examples in hw6 problem 2a, 2b)
- Use matrices: if  $Av = Y$ , then  $A^*Av = A^*Y$ , where  $A^* = A^T$ .
- Kepler's Law, Tentax, Oceantide...there are many examples