CS-540: Introduction to Artificial Intelligence
Summer 2003 Final Exam Study Guide

I. Planning
   a. Situation calculus
   b. STRIPS planning
   c. POP planning

II. General Machine Learning
   a. Inductive learning
      i. Classification tasks
      ii. Regression tasks
   b. Feature vector representation
   c. Experimental methodology
      i. Train/test/tune sets
      ii. Cross-validation
   d. Overfitting and avoidance
   e. Hypothesis spaces
   f. Feature spaces
      i. Feature selection
      ii. Feature induction
   g. Characteristics and tradeoffs of the various machine learning algorithms

III. Decision Trees
    a. ID3 algorithm
    b. Information gain and entropy
    c. Pruning

IV. k-Nearest Neighbors
    a. Distance metrics
    b. Voting schemes
    c. Tuning k

V. Neural networks
   a. Perceptrons
   b. Perceptron training rule, gradient descent
   c. Multi-layer networks, backpropagation
   d. Expressiveness of perceptrons & ANNs

VI. Bayesian Learning
    a. General probability theory
    b. Bayes’ rule
    c. Minimum description length principle
    d. Bayesian classification
       i. Naïve Bayes classifier
       ii. Bayesian networks
          1. Structure
          2. Learning
          3. Inference

VII. Advanced Machine Learning Topics
    [Note: you only need a qualitative understanding of these topics... not specific algorithms/calculations]
    a. Alternatives to feature vectors
       i. Sequence data
       ii. Relational data
    b. Using unlabeled data
       i. Unsupervised / semi-supervised / active learning
    c. Ensemble methods

Note: this is a list of topics we've covered SINCE the midterm. However, the final is CUMULATIVE. Topics on the midterm study guide will comprise 25%-33% of the final exam questions, and the rest will be on topics listed in this study guide.

The exam will be closed-book. You will be allowed a 2-sided page of hand-written notes and a calculator (I highly recommend the calculator this time).