Resources for Math Background

This course ties together a ton of mathematical concepts from many different areas. Some of these you may know pretty well, and some, like matrix calculus, may be very new to you. Here are some math references that may help you throughout the semester.

Math4ML Textbook

The textbook below is a great resource for those hoping to brush up on the prerequisite mathematics background for this course.

- Mathematics for Machine Learning, Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong. Free online.

Miscellaneous

The lists below contain some resources for reviewing Probability and Linear Algebra. These come from a variety of sources but are all very thorough.

Probability:

- Probability Cheatsheet, Blitzstein & Chen
- Probability Review (slides), Rob Hall

Linear Algebra:

- Linear Algebra Review (notes), Zico Kolter
- Linear Algebra Review (videos), Zico Kolter
- Matrix Cookbook (notes), Petersen & Pederson

Geometry:

- point distance to plane (Khan Academy)
- visualizing dot product (Khan Academy)
- define a line with a vector (Khan Academy)

CS Fundamentals:

1. Runtime Analysis
2. Graph Search

10-606/607 Lecture Notes

The table below contains some of the lecture notes from Geoff Gordon's prior offering of the 10-606/607 course, Math Background for Machine Learning.

Lecture Topic	**Lecture Notes**
Sets	Sets Lecture Notes
Types	Data Types and Functions
Logic	Propositional Logic
Probability	Probability 1 Probability 2 Factored Distributions Mean and Variance
Linear algebra; functions and function spaces	Vector Spaces Vector Spaces and Dimension Geometry of Functions Matrices and Linear Operators Linear Equations
Matrix Calculus	Vector Space Examples Matrix Differentials Working with Differentials Second and Higher Differentials Working with Differentials II

Statistics and inference	Continuous Random Variables Statistical Inference