UVA CS 6316-4501: Fall 2016: Quiz-0

Your UVA ID in capital letters:

Your full name:

Minimum-minimum background test

1. basic probability

a. True or False ? If P(A| B) = P(A),then P(AB) = P(A)P(B)

b. If A and B are disjoint events, Pr(B) > 0, what is the value of Pr(A | B) ?

2. linear algebra

Let $x = (x_1, x_2, x_3)^T$ and:

$$\begin{cases} 2x_1 + 2x_2 + 3x_3 = 1 \\ x_1 - x_2 = -1 \\ -x_1 + 2x_2 + x_3 = 2 \end{cases}$$

Write it into matrix form (i.e. Ax = b)

3. Discrete and Continuous Distributions

Match the distribution name to its formula.

Multivariate Gaussian	$p^x(1-p)^{1-x}$
Exponential	$\frac{1}{b-a}$ when $a \leq x \leq b$; 0 otherwise
Uniform	$\binom{n}{x}p^x(1-p)^{n-x}$
Bernoulli	$\lambda e^{-\lambda x}$ when $x \geq 0$; 0 otherwise
Binomial	$\frac{1}{\sqrt{(2\pi)^d|\Sigma|}}\exp\left(-\frac{1}{2}-(\mathbf{x}-\mu)^\top\Sigma^{-1}(\mathbf{x}-\mu)\right)$

Although many students find the machine-learning class to be very rewarding, the class does assume that you have a basic familiarity with several types of math. Before taking the class, you should evaluate whether you have the mathematical background the class depends upon.

- Multivariate calculus (at the level of a first undergraduate course). For example, we rely on you being able to take derivatives and integrals. During the class you might be asked, for example, to derive gradients of multivariate functions.

- Linear algebra (at the level of a first undergraduate course). For example, we assume you know how to multiply vectors and matrices, and that you understand matrix inversion, eigenvectors and eigenvalues.

- Basic probability and statistics (at the level of a first undergraduate course). For example, we assume you already know how to find the mean and variance of a set of data, that you are familiar with common probability distributions such as the Gaussian and Uniform distributions, and that you understand basic notions such as conditional probabilities and Bayes rule. During the class, you might be asked to calculate the likelihood (probability) of a data set with respect to some given probability distribution, and to then derive the parameters of the distribution that maximize this likelihood.