Coursework **Fall 2019**
Machine Learning (B555) **Roni Khardon**
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Written Assignment 1

This assignment is due by Monday 9/9 11:59pm. Please submit solutions as a single PDF file through Canvas. Handwritten or typed solutions are fine, so long as the solution is legible and is submitted as a PDF. You might find LaTeX to be a useful tool for typesetting text and math expressions.

Additional reading: I strongly recommend reading the PRML web solutions for questions 1.7, 1.8, 1.9, 1.12, 1.17, 2.5. You will not directly use them to solve the homework assignment but they will provide some context and will repeat or emphasize some facts that you can use.

1. Solve problem 1.13 in the textbook.
2. The Poisson distribution is $p(x|\lambda) = \frac{e^{-\lambda}\lambda^x}{x!}$ where x is an integer value. The distribution satisfies $E[x] = \text{VAR}[x] = \lambda$.
   (i) Calculate the maximum likelihood estimate of λ from an IID sample of size N: $x_1, \ldots, x_N$.
   (ii) Calculate the mean and variance of the maximal likelihood estimator.
3. Solve problem 1.30 in the textbook.
4. Solve problem 2.10 in the textbook.
5. Solve problem 2.38 in the textbook. This repeats and completes some calculations from class for the Bayesian treatment of the mean for the Gaussian variable.