

#### Assignment 4:

Due Oct 17, 2016, 4pm by email to [dalhousieml2016@gmail.com](mailto:dalhousieml2016@gmail.com) with subject line A4. The page limit for this assignment is 2.

1. What is the goal of supervised machine learning?
2. Explain briefly what k-fold cross validation is used for.
3. What is a maximum likelihood estimate?
4. What is a hyper-parameter?
5. Why do you need nonlinearities in a deep network?
6. What is a maximum likelihood estimate and how does it relate to MAP?
7. Write down Bayes rule.
8. Given is a model of the form  $y = \sin(w^2 * x + b^2)$ . Derive the learning rule that minimizes the MSE. Hint: The derivative of  $\sin(x)$  is  $\cos(x)$ .
9. Write a python program with less than 10 lines that reads in an image and finds vertical lines. Print the original and the filtered image as well as your code.