Assignment 3:

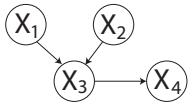
Due Oct 10, 2016 by email to dalhousieml2016@gmail.com with subject line A3

1. The file train.txt on our course wiki contains data with 11 rows and 200 columns representing 200 examples of data with 10 feature values and 1 binary class label (the last row). Predict the class label and discuss how good your prediction is.
   Hint: This assignment is similar to the last except that I now give you the dataset you should classify.

2. Given is a Bernoulli random variable *Y* (biased coin) is characterized by the probability $p(Y=y)=\phi^{y}\ (1-\phi)^{1-y}$. Derive the maximum likelihood estimate of the parameter ϕ from *m* independent trials in which *h* heads are thrown.

   Hint: Write down the joined distribution of *m* trials and maximize the corresponding maximum log likelihood

3. Factorize the joint probability *p(x1,x2,x3,x4)* according the following graphical causal model:



4. What is the output of a neural network if the above graph is a neural network with *tanh* gain function and weight $w_{x3x1}=1$, $w_{x3x2}=2$, $w_{x4x3}=3$? Write out the network as a function $x_4=$ … and give the value for input $x_1=1$, $x_2=2$.