Homework 1: Linear Algebra

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Profilierungsmodul II

Due: Tuesday October 24, 2016 18:00

**Please submit your solution to [beroth at cis dot uni-muenchen dot de]
Please submit individually for this homework**

Exercise 1:   Linear Algebra [5 points]

Read Chapter 2 of the Deep Learning (DL) book (www.deeplearningbook.org/). **Note
down and submit at least two questions that are still unclear after reading the
chapter, and that you could not resolve easily** (e.g. by re-reading the paragraph
or by consulting Wikipedia). (Only) If you don't have any questions, please answer the
following:

- Name a property of a matrix A so that the left and right Eigenvectors of A are
  identical if A has that property.

- Which method would you recommend to use for solving an indeterminate system
  of linear equations, and why?

- The degree matrix of an undirected graph contains the number of edges attached
  to each vertex on its diagonal. How are the number of edges and the trace of the
  degree matrix related?

- Given a system of linear equations $\mathbf{Ax} = \mathbf{b}$, $\mathbf{A}$ is a $m \times n$ matrix.

  - Assume $m > n$. Is the column space of $\mathbf{A}$ all of $\mathbb{R}^m$? Is the system solvable
    for all values of b?

  - Assume $m = n$, and $\mathbf{A}$ is the identity matrix. Is the column space of $\mathbf{A}$ all of
    $\mathbb{R}^m$? Is the system solvable for all values of b?