In this exercise we consider **Chapters 7 & 8** of the book 'Deep Learning' (Optimization and Regularization).

1. **Optimization**
   (a) Implement Adam (2)
   (b) Train and plot models with multiple optimizers (2)
   (c) Implement Learning Rate Decay (2)
   (d) Plot Learning Rate Schedules (1)
   (e) For course improvements, we would like your feedback about this question. At least tell us how much time you did invest, if you had major problems and if you think it's useful.

   Points for Question 1: 7

2. **Regularization**
   (a) Implement Dropout (2)
   (b) Implement L1 and L2 Regularization (3)
   (c) Plot loss and accuracy (1)
   (d) Plot parameters (1)
   (e) Answer Data Augmentation question (1)
   (f) Answer Early Stopping questions (1)
   (g) For course improvements, we would like your feedback about this question. At least tell us how much time you did invest, if you had major problems and if you think it's useful.

   Points for Question 2: 9

You can achieve a total of **16 points** for this exercise. Additionally you can achieve **1 bonus point** for answering the feedback questions.

Please send the **solution notebooks of your group of three** via ILIAS until **12.11.2018 6 pm**.

**Note:** Jupyter notebooks will be executed **from top to bottom**. To **avoid point deduction** check your notebook by the following steps: 1. Use the python 3 kernel (`Kernel > Change kernel > Python 3`), 2. Run the full notebook (`Kernel > Restart & Run All`), 3. Save (`File > Save and Checkpoint`).