In this exercise we consider **Chapter 9** of the book 'Deep Learning' (Convolutional Networks).

1. **Warmup**
   (a) Install PyTorch. (1)
   (b) Plot dataset samples. (1)
   (c) Calculate convolution output size. (1)
   (d) For course improvements, we would like your **feedback about *this* question**. At least tell us how much time **(hours)** you did invest, if you had major problems and if you think it's useful.

   Points for Question 1: 3

2. **Convolution Implementation**
   (a) Implement the convolution layer (forward+backward, no stride or padding). (6)
   (b) Add stride to the convolution layer class (forward+backward). (2)
   (c) Add padding to the convolution layer class (forward+backward). (2)
   (d) Train a model with convolutional layers. (1)
   (e) Compare the performance of a convolutional model and an MLP. Explain the results. (2)
   (f) For course improvements, we would like your **feedback about *this* question**. At least tell us how much time **(hours)** you did invest, if you had major problems and if you think it's useful.

   Points for Question 2: 13

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 **19.11.2018 12 pm (noon)**.

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`).