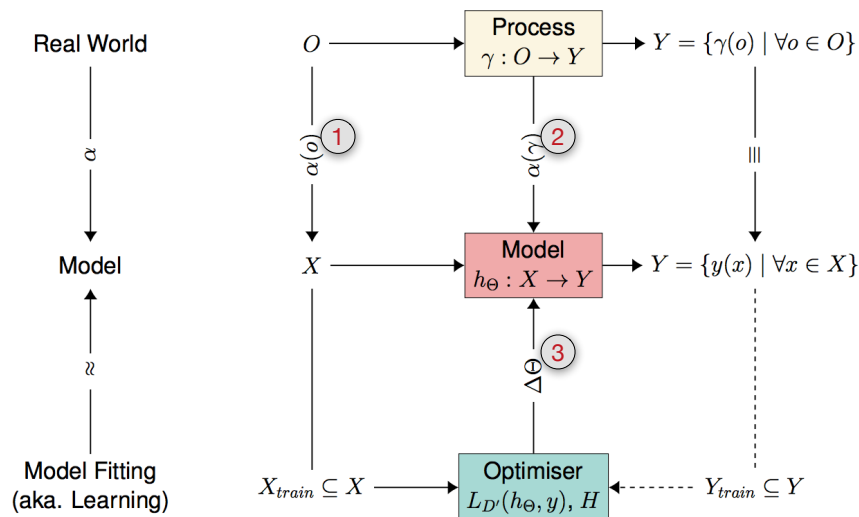# Exercise Sheet

Learning Goals

- Machine Learning Basics
- Model Formation

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1. **●○○ Machine Learning (general)** Describe the terms *supervised learning*, *unsupervised learning* and *reinforcement learning*. Sketch for each learning paradigm a typical problem together with a description of its technical realization.

   (a) Supervised Learning

   (b) Unsupervised Learning

   (c) Reinforcement Learning

2. **●○○ Machine Learning (general)** In the following illustration of a supervised machine learning system, describe the edges marked as (1), (2) and (3).

3. **Machine Learning (general)**

   (a) Which design decisions are to be made during the development of a learning system?

   (b) Name an example of a problem which cannot be solved by learning. Explain your answer.

   (c) Describe the bias-variance trade-off.

   (d) What is the key message of the "no free lunch theorem"?

   (e) Describe two learning problems for which two different hypothesis spaces need to be developed. The hypothesis spaces have to differ in the strength of the inductive bias (the set of the a-priori assumptions, that are made for the hypotheses).