How does a model “learn”?

- A model that “learns” from data can be viewed as an optimization process
- The “learning” occurs as the model optimizes its parameters to find a combination of parameters that produces a function that best fits the data
- “Best fit” is determined by a scoring criteria (ie. objective) that compares the model to the observed data, which is designed for a specific task
    - Example objective functions: Classification accuracy (supervised learning), distance to cluster centroid (unsupervised learning), reward function (reinforcement learning)

The learning process

Components of a trainable model

- *x* - input data (eg. an image containing blood cells, flower petal width/length)
- *y* - target data (eg. cell type classification, centroid of the flower clusters)
- θ - the learned parameters that characterize the model, *f*
- *L* - an objective function

$$\underset{\theta}{\operatorname{argmin}}\, L\big(y, f(x, \theta)\big)$$