Surname _____ Name _____ Student ID (Matricola) _____

# Regression with neural networks

We want to evaluate the quality of wine based on some of its characteristics. Read the data from file wine.csv

The first 11 columns correspond to the following features:
`fixed acidity, volatile acidity, citric acid, residual sugar, chlorides, free sulfur dioxide, total sulfur dioxide, density, pH, sulphates,alcohol` while the last column corresponds to the quality level of wine.

- Before the training phase apply z-score normalization to data
- Perform a k_Fold cross validation splitting on the dataset (k=5)

Find the best value for lambda, alpha and the number of units in each single layer for a neural network with 2 hidden-layers.

After the training phase, compute the following metrics on the Validation Sets:

- RMSE
- MSE
- MAE
- $R^2$

Evaluate the best model with RMSE measure.

Write a function which returns the necessary vectors for learning curves diagnostics.

Estimate the wine quality for the following sample

`6.0, 0.31, 0.47, 3.6, 0.067, 18.0, 42.0, 0.99549, 3.39, 0.66, 11.0`