# In-class Participation Assignment
## Group 10
MIE 1624H        Due: October 25, 2022

Explain and visualize bias-variance tradeoff in the context of logistic regression algorithm. Describe and illustrate hyperparameter tuning for logistic regression. Which hyperparameters for logistic regression you can tune in Python's `scikit-learn` module and how? Relate hyperparameter tuning and bias-variance tradeoff to cross-validation.

Explain how do you evaluate accuracy of classification results produced by logistic regression algorithm.

In your IPython example, show how to solve a classification problem of your choice (select a dataset that was not used in this course) using logistic regression algorithm. In addition, explain how you have done hyperparameter tuning for your logistic regression example. Visualize and explain accuracy of your results, e.g., accuracy scores, confusion matrix, ROC curves, learning curves, etc. Compute, plot and explain bias-variance tradeoff for your example. Include computing bias-variance tradeoff for $\ell_1$-regularized regression with `scikit-learn` module and by solving the optimization problem directly (minimizing cost function subject to $\ell_1$-regularization constraint).

In your IPython example, make sure that solving optimization problem with hyperparameter $C$

$$\min_{\boldsymbol{\theta}} \quad \|\boldsymbol{\theta}\|_1 + C \cdot J(\boldsymbol{\theta})$$

directly and using `scikit-learn` module produces the same results. Explain which Python modules you have used in your code to solve this optimization problem directly.

Prepare 10 minute presentation of your results. Before the presentation, upload your PowerPoint slides, PDF slides, IPython Notebook `ipynb` file(s) and all data files in `zip` archive via Quercus portal, such that those can be posted on the course web-page and re-used by your colleagues for assignments and a course project. Presentation materials should be uploaded to Quercus portal by 4:00pm on the due date. If you have any questions about your in-class presentation assignment, please contact course TAs Eric Floro `eric.floro@mail.utoronto.ca` or Saeede Hasanpoor `saeede.hasanpoor@utoronto.ca`.