Assignment 2: Meta-heuristics, Maximum-Likelihood Estimation, Machine Learning Basics
Due Date: March 21st 2020 @ 11:59 PM

Instructions:

1. This assignment can be done in groups of up to three students
2. You should submit your assignment to the email addresses:
   - inzamam.rahaman@sta.uwi.edu
   - shivramx@gmail.com

   You should use the subject: "COMP3608 Assignment 2", and you should submit a single zip folder named using the student ids of all members separated by commas. This **zip** folder should contain a README.md or readme.txt file with the names and id numbers of all group members.
3. You should separate your solutions to each component into separate sub-directories named P1, P2, and P3

Part 1 - Constrained Optimisation

This part involves converting a constrained optimisation problem into an unconstrained optimisation problem that you must then attempt to solve using a metaheuristic method. You are free to use metaheuristic methods we did not cover in class as well and are free to use any code developed in class.

Read the documentation here about converting constrained problems to unconstrained problems using quadratic penalties.

Convert and attempt to solve the Rosenbrock function constrained to a disk using your choosen metaheuristic, attempt to find a solution to this problem.

Part 2 - Maximum Likelihood Estimation

The data contained in "data.npy" is drawn from a 2-parameter Weibull distribution. Derive the negative log-likelihood for the Weibull distribution, and using gradient descent in PyTorch, determine the values of λ and k using your negative log-likelihood.

Part 3 - Encoding Features

Diamonds may be described in terms of several properties that influence their prices. There is a dataset on diamonds and their prices on Kaggle. You want to build a model that uses the other features to predict prices. Describe how you would encode those features such that you could then apply an algorithm such as Linear Regression to said dataset.