Problem Statement

This project is intended to be a gentle introduction to Genetic Algorithms (GAs). Your task is to design your own GA to evolve a solution $\mathbf{x} = \{x_1, x_2\}$ that maximizes the function

$$f(x_1, x_2) = 21.5 + x_1 * \sin(4\pi x_1) + x_2 * \sin(20\pi x_2)$$

subject to constraints

$$-12.0 \leq x_1 \leq 12.0 \text{ and } 6.0 \leq x_2 \leq 6.0$$

As suggested by Eiben & Smith (the textbook), include some of the GA parameters in the representation of each individual (and perhaps, test different selection schemes). I suggest that you first build and test a first version that is simple and straight-forward, but later on include parameters in the representation (version 2) and perhaps, even make it more potent (faster or/and more efficient) in a third version using selection/diversification ideas that you've learned from Eiben & Smith, external sources, or from own imagination.

Run each GA version 10 times (at least) using a different random seed for each run. For each GA version, record the *progress of evolution* over time, by calculating the mean and standard deviation of both *average* and *maximum* fitness of a 1000-individual population, over time (call this PE). Also, for each GA version (and for all 10 runs), record the coordinates of the *fittest* individual (**x**) with its *fitness* value f(**x**) (call this FF).

NOTE: The GA should be written from scratch, do not make use of any packages to generate the GA.