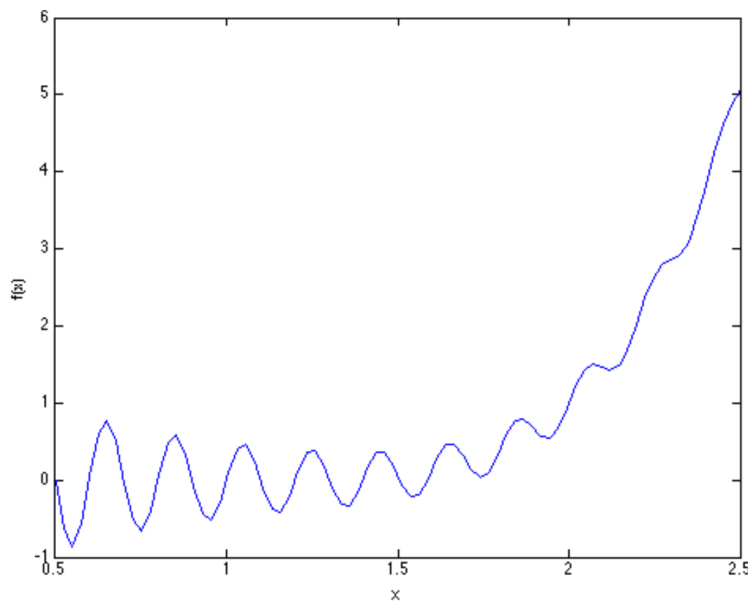


Homework #2

Part 1 – Hill Climbing

You have the function $f(x) = \frac{\sin(10\pi x)}{2x} + (x - 1)^4$ in the $[0.5, 2.5]$ range. You can view its figure in the image below. Your goal is to find the global minima of this function in mentioned range. You must implement the algorithms written below in order to find the minimum point and also plot the function indicating the point you have found.



Implement the following algorithms:

- Hill climbing
- Iterative hill climbing
- Simulated annealing

Part 2 – Genetic Algorithm

Here's a game. You have 10 cards which are numbered from 1 to 10. Note that there are no two cards with the same number. You have to divide these cards into 2 equal piles. In order to win the game you have to achieve the following conditions:

- The summation of the cards in pile 1 must be 36
- The production of the cards in pile 2 must be 360

Build a genetic solver which can find the solution of the game. Any produced gen from the crossover operation has a probability of 40% chance to mutate. Also record all utility values while the algorithm runs and then plot your utility function based on the steps in order to see how the genetic algorithm works and its speed changes.

Hint: In order to implement the probability of mutation you can use random functions.

Note: You can use any programming language as you wish

Good Luck
Have fun!