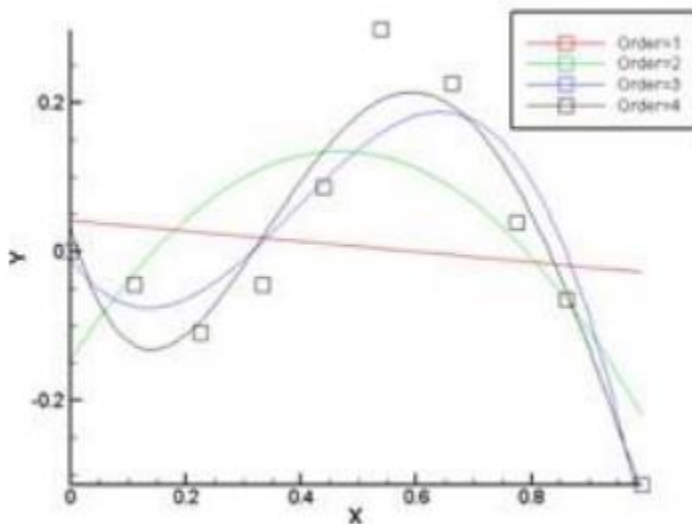


Smooth Curve Fitting

Smooth curve fitting is the process of constructing a curve, or mathematical function, that approximately fits a series of data points.

In this assignment, you are given set of points and you will use the genetic algorithm to find the best coefficients to fit a curve (polynomial equation) to these points such that the distance between the polynomial and the points is minimum.



http://en.wikipedia.org/wiki/Curve_fitting

Notes on what you must implement:

- Each coefficient is a floating point between $[-10, 10]$.
- The fitness function is the mean square error (MSE). The best individual is the one with the smallest fitness function because we want to minimize MSE.
- Use tournament selection.
- Use 2-point crossover.
- Use non-uniform mutation.
- Given a file of M data sets (i.e. M test cases), for each case, print and save the list of coefficients and the total error. You must write the output to a file.

Input File Structure:

- First line: M represents number of sets.
- Each set consists of: Line N D, where N is number of points and D is the requested polynomial degree. This is followed by N lines each one representing an (x, y) point.
- For example:

```
1
4 2
1 5
2 8
3 13
4 20
```

This example has 1 test case which has 4 points, and the requested degree is 2 (a_0, a_1, a_2).

Output File Structure:

- Consists of M lines, each line has D+1 coefficients followed by "Error =" Total Error.
- For example, for the above case, the output might be:
1.33, 0.12, 4.09, Error = 2.1563

Notes:

- The number of team members is 2 or 3. It must be same team as pervious assignment.
- Reading from and writing to files is a must.
- The assignment will be delivered and discussed in next week's lab.
- **Cheating will not be tolerated and cheaters will get ZERO without argument.**