**CPE383 Machine Learning: Quiz 4**

1. The following points (xi, yi) are discrete samples from a function f(x) = ax3 + bx2 + cx + d.

1.a Show the update rule equation used to find the current a, b, c, and d after

each iteration. Make sure you show the mathematics on how this is derived.

A picture containing chart

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1.b Write a program to find the best fit a, b, c, and d using gradient descent. You must write the gradient descent loop yourself and not use any gradient descent libraries. Attach the source code as well. Hint: You should get a, b, c, and d close to 0.5, 5.3, -2.7, and 3.5, respectively.

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1. Redo Problem 1b, but use the numerical method to calculate all your partial derivatives, where h is a very small number.

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1. Solve Problem 1b using Pseudo-Inverse Linear Regression to find (a, b, c, d). You can use numpy or other tools to invert matrices.

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1. Solve Problem 1b using the Gauss-Newton method to find (a, b, c, d). You can use numpy or other tools to invert matrices in each iteration.

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