M439 Numerical Analysis Review Guide for 2nd Exam Wednesday October 22nd.

Interpolation
Given a set of n+1 data points (for a small value of n -- such as 3), write down the system of linear equations that would have to be solved to find the polynomial of degree n passing through these points.

Lagrange Interpolating Polynomials
Know the formula for the polynomial passing through the n+1 points using Lagrange Coefficient Polynomials
Given a small set of n points (at most 4), and a function f(x) find the polynomial and use it to approximate a the function at a given point

Newton Polynomials
Advantage of Newton polynomials over Lagrange Polynomials.
Given interpolating points and a function f(x): Be able to calculate Newton interpolating polynomials by:
Constructing divided-difference table
Using the divided-difference table to calculate the desired degree Newton polynomial

Curve Fitting with Least Squares Line
Formula for Root Mean Square Error
Definition of least-squares line. Give definition and be able to sketch a graph

I will give you the Normal equations (you do not have to memorize). However you ***need to be able to derive or outline*** the derivation of these equations.

Given a small set of data points, use the normal equations to find the least squares line, and calculate the Root Mean Square Error.

The Power Fit: do not have to memorize the equation for power fit for $y = a^M$. I will give you this equation***.***
Derive this equation by minimizing the least squares sum.
Given data points, find the power fit using equation and calculate Root Mean Square Error.

Curve Fitting Through Data Linearization
Explain the data linearization method for fitting the exponential curve $y = Ce^{Ax}$ to data points. Apply this method to a given problem to find a curve to fit data points. Also compute the root-mean-square error.

Given formula for data linearization of logistic function, apply to an example problem.

Approximation the Derivative
Know the definition of the derivative of a function at x.
Know the **Forward Difference formula** (2); **Central Difference Formula and apply to examples.**
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