

Homework 2

CS 4793 – Fall 2003
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assigned September 23, 2003
due October 7, 2003

- For the training data pairs, $(-2,4)$, $(1,-3.5)$, $(4,-2)$ find
 - the interpolating polynomial of second order,
 - the best least squares approximating straight line
 - the best L_1 approximating straight line
 - the best L_∞ approximating straight line
- Consider the four points, $(1,4)$, $(2,3)$, $(3,2)$, and $(4,1)$. Find an interpolation using the four basis function $\varphi_1(x) = e^x$, $\varphi_2(x) = \ln x$, $\varphi_3(x) = \sin x$, and $\varphi_4(x) = \tanh x$.
- Show contour plots for the following three two-dimensional Gaussian distributions:

(a) $\boldsymbol{\mu} = [2 \ -1]$, $\boldsymbol{\Sigma} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

(b) $\boldsymbol{\mu} = [-2 \ 0]$, $\boldsymbol{\Sigma} = \begin{bmatrix} 1 & 0 \\ 0 & 3 \end{bmatrix}$

(c) $\boldsymbol{\mu} = [0 \ 3]$, $\boldsymbol{\Sigma} = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

- Do Exercise 1.37 for these training data.

Class 1			Class 2		
x_1	x_2	d	x_1	x_2	d
-1	-2	0	4	1	1
-1	2	0	5	4	1
0	0	0	4	3	1
0	1	0	5	3	1
-1	0	0	4	5	1

- Do Experiment 1 (p. 118). Choose the Hermitian function. What degree polynomial best approximates the target function based on L_∞ (its maximum distance from the target)? If d is the best, choose 4 other degrees and describe how far off they are.