Assignment for Interpolation

Read Pages 341 – 349

Exercises for Section 5.1 Page 349 Lagrange Interpolation #1, one of (#4, #5, #6), #7, #13(all parts), #14 (all parts)

For #1 use MATLAB to draw the graphs.
Do only one of 4, 5, 6; assignment will be made.
For #13 us MATLAB routine **pinterp** capture the formula and graph to include with your answer to the question.
For #14 part (b) use MATLAB routine **pinterp** capture the formula and graph to include with your answer to part (c).
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Read Pages 363 – 369

Exercises for Section 5.3 Page 371 Divided Difference Form of Interpolation #3, #6, #7, #10, #11, #15, California Problem, DD-Table Problem

For #3 and #4 do the calculations by hand; show the work.
For #7 construct the divided difference table by hand; do not compute the values of any logarithms.
For #15 use MATLAB routines **divdiff** and **divpoly**; include print outs from MATALB.

California Problem

Consider the following population data for the state of California.

Year	1940	1950	1960	1970	1980	1990
Population in Millions	6.9	10.5	15.7	19.9	23.6	29.7

Table 1.

We are to build an interpolation polynomial model to this data. To simplify the values involved and also possibly to aid in the prevention of roundoff error we 'rescale' the data as follows.

Year	40	50	60	70	80	90
Population in Millions	6.9	10.5	15.7	19.9	23.6	29.7

Table 2.

Enter the data in Table 2, into MATLAB. Call the years x and the populations y.
Use routine divpoly in MATLAB do the following.
a) The population in 1930 was about 5.7 million. Evaluate the interpolation polynomial to the data in Table 2 at x = 30. Compute the absolute and relative error in the value obtained from the evaluation of the interpolant.
b) Use **divpoly** as in part a, but predict the populations in 1985, 2000, and 2010. Do these values seem reasonable? Explain.
c) Use routine **pinterp** with the data in Table 2 and sketch the interpolant over 1900 to 2010 by setting the minimum value of x to 0 and the maximum to 110. Print out the graph and annotate it to explain your answers to parts a and b. (Generate the sketch with
y-coordinates ≥ 0.)

DD-Table Problem

Given the following divided difference table.

	0th – DD	1st – DD	2nd – DD	3rd – DD	4th – DD
4	a				
		f			
7	b		m		
		g		r	
9	c		n		t
		h		s	
10	d		p		
		k			
12	e				

(a) Write an expression for the interpolant that goes through the set of ordered pairs {(4,a), (7,b), (9, c)}.

(b) Write an expression for the interpolant that goes through the set of ordered pairs { (7,b), (9, c), (10, d), (12, e)}.

(c) The point (15, w) is to be added to the table. Write and expression for the interpolant through the ordered pairs {(12, e), (15, w)}.