HW#5 EGM6341

Due: 2/20/2023

From textbook by Atkinson

pp185-194

#6, #18, #21, #23

#6 Suppose you are to take a table of values of sin (x), $0 \le x \le \pi/2$, with a step size of h. Assume linear interpolation is to be used with the table, and suppose the total error, including the effects due to rounding in table entries, is to be at most 10^{-6}. What should h equal (choose it in a convenient size for actual use) and to how many significant digits should the table entries be given?

#18 Do an inverse interpolation problem using the table for $J_0(x)$ given in Section 3.2. Find the value of x for which $J_0(x) = 0$, that is, calculate an accurate estimate of the root. Estimate your accuracy, and compare this with the actual value x = 2.4048255577.

$f = J_0(x)$	x
0.223891	2
0.166607	2.1
0.110362	2.2
0.05554	2.3
0.002508	2.4
-0.04838	2.5
-0.0968	2.6
-0.14245	2.7
-0.18504	2.8
-0.22431	2.9

#21 The following data are taken from a polynomial of degree ≤5. What is the degree of the polynomial?

x	-2	-1	0	1	2	3
p(x)	-5	1	1	1	7	25

#23 For $f(x) = 1/(1 + x^2)$, $-5 \leq x \leq 5$, produce $P_n(x)$ using $n + 1$ evenly spaced nodes on [- 5, 5]. Calculate $P_n(x)$ at a large number of points, and graph it or its error on [- 5, 5), as in Figure 3.6.

You can use Matlab to save time.

But you need provide all the Matlab commands, including input data/functions and output data and graphs. Give as many details as you can.

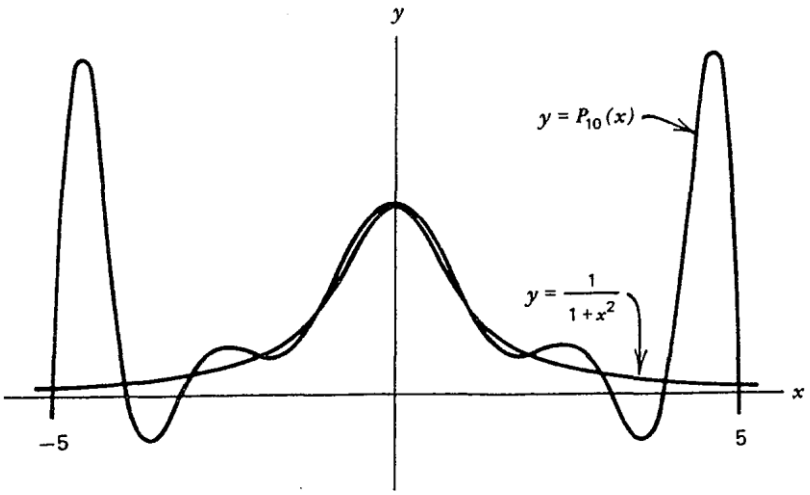

Figure 3.6 Interpolation to $1/(1 + x^2)$.