MA 396 – Lesson 7 Board Problems

1. Apply the extrapolation process in Example 1 of the text to determine $N_4(h)$, an approximation to $f'(x_0)$, for $f(x) = \tan^{-1} x$, $x_0 = \sqrt{2}$, $h = 1$.

2. The following data give approximations to the integral $M = \int_0^{\pi} \sin x\, dx$:

$N_1(h) = 1.570796$, $N_1\left(\frac{h}{2}\right) = 1.896119$, $N_1\left(\frac{h}{4}\right) = 1.974232$, $N_1\left(\frac{h}{8}\right) = 1.993570$. Assuming that $M = N_1(h) + K_1h^2 + K_2h^4 + K_3h^6 + K_4h^8 + O(h^{10})$, construct an extrapolation table to determine $N_4(h)$.

Lesson 7

Problem 1 x= 1.41421356

h	N1	N2	N3	N4
1	0.3926991			
0.5	0.348771	0.33412831		
0.25	0.3371939	0.33333484	0.333282	
0.125	0.334298	0.33333275	0.333333	0.33333341

Problem 2

h	1.570796			
h/2	1.896119	2.00456		
h/4	1.974232	2.00027	1.99998364	
h/8	1.99357	2.000016	1.99999909	1.999999
	Actual	**2.0000**		