A.2 solution

xj=4

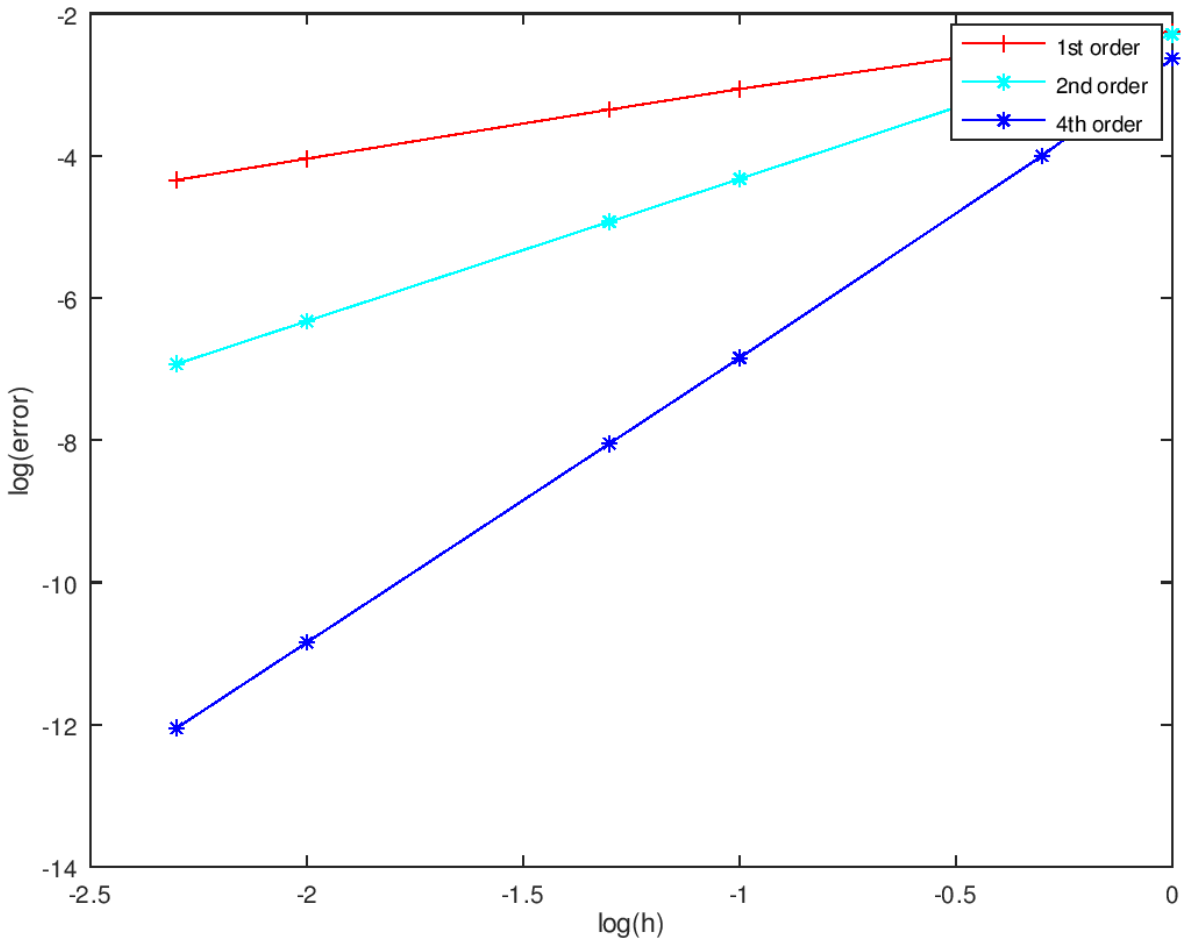
	First-order scheme f'(xj)=	|error|	Second-order scheme f'(xj)=	|error|	Fourth-order scheme f'(xj)=	|error|
@h=1.000	0.00415364	0.005498047	-0.0064490	0.00510462825	0.00098094	2.3253e-03
@h=0.500	0.00219537	0.003539773	-0.0025458	0.00120141849	-0.00124475	9.9651e-05
@h=0.100	-0.00047643	0.000867973	-0.0013916	0.00004718047	-0.00134426	1.4342e-07
@h=0.050	-0.00089912	0.000445281	-0.0013562	0.00001178842	-0.00134439	8.9348e-09
@h=0.010	-0.00125349	0.000090910	-0.0013449	0.00000047145	-0.00134440	1.4281e-11
@h=0.005	-0.00129883	0.000045572	-0.0013445	0.00000011786	-0.00134440	8.9273e-13

log(h)= 0.00000 -0.30103 -1.00000 -1.30103 -2.00000 -2.30103

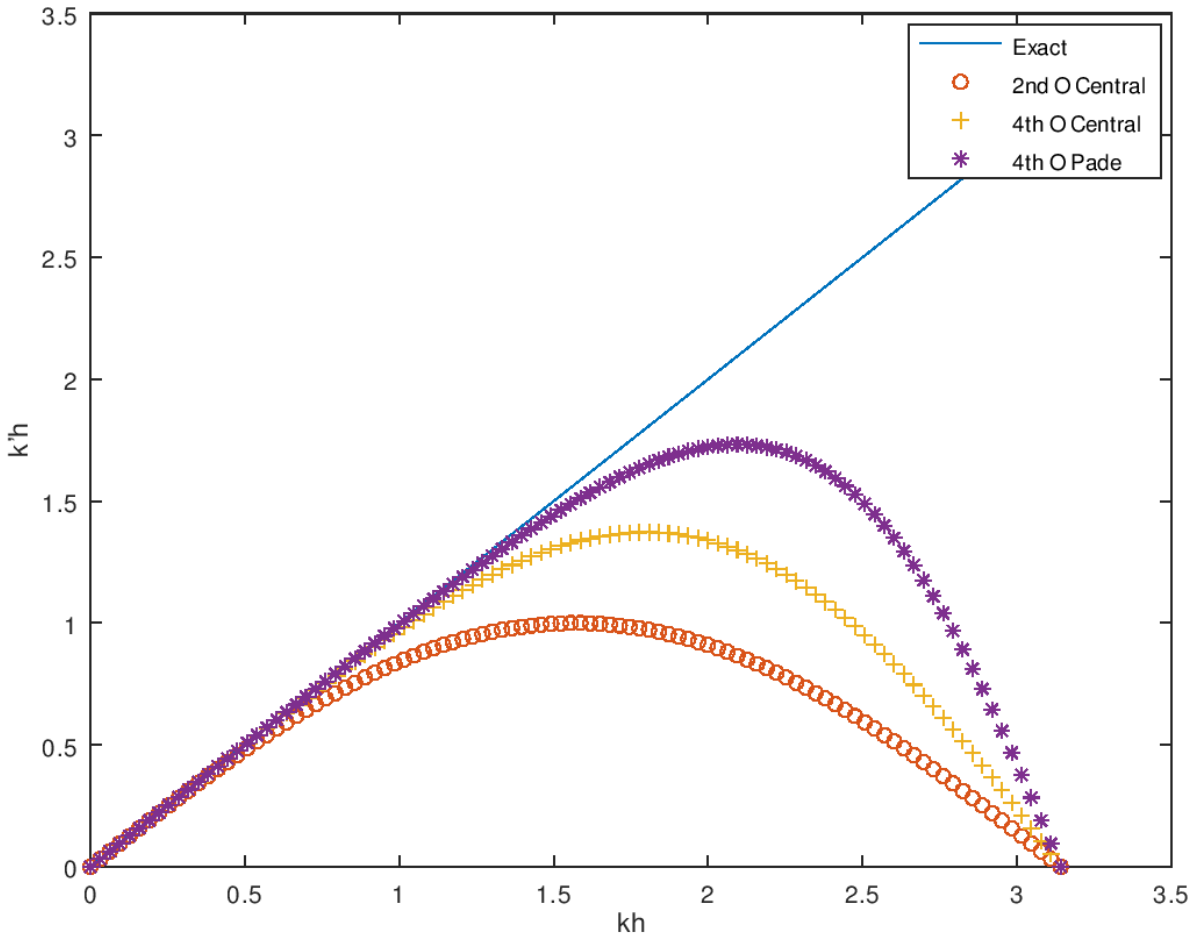
first-order scheme: log(|error|)= -2.2598 -2.4510 -3.0615 -3.3514 -4.0414 -4.3413

second-order scheme: log(|error|)= -2.2920 -2.9203 -4.3262 -4.9285 -6.3266 -6.9286

fourth-order scheme: log(|error|)= -2.6335 -4.0015 -6.8434 -8.0489 -10.8452 -12.0493



B.2 solution

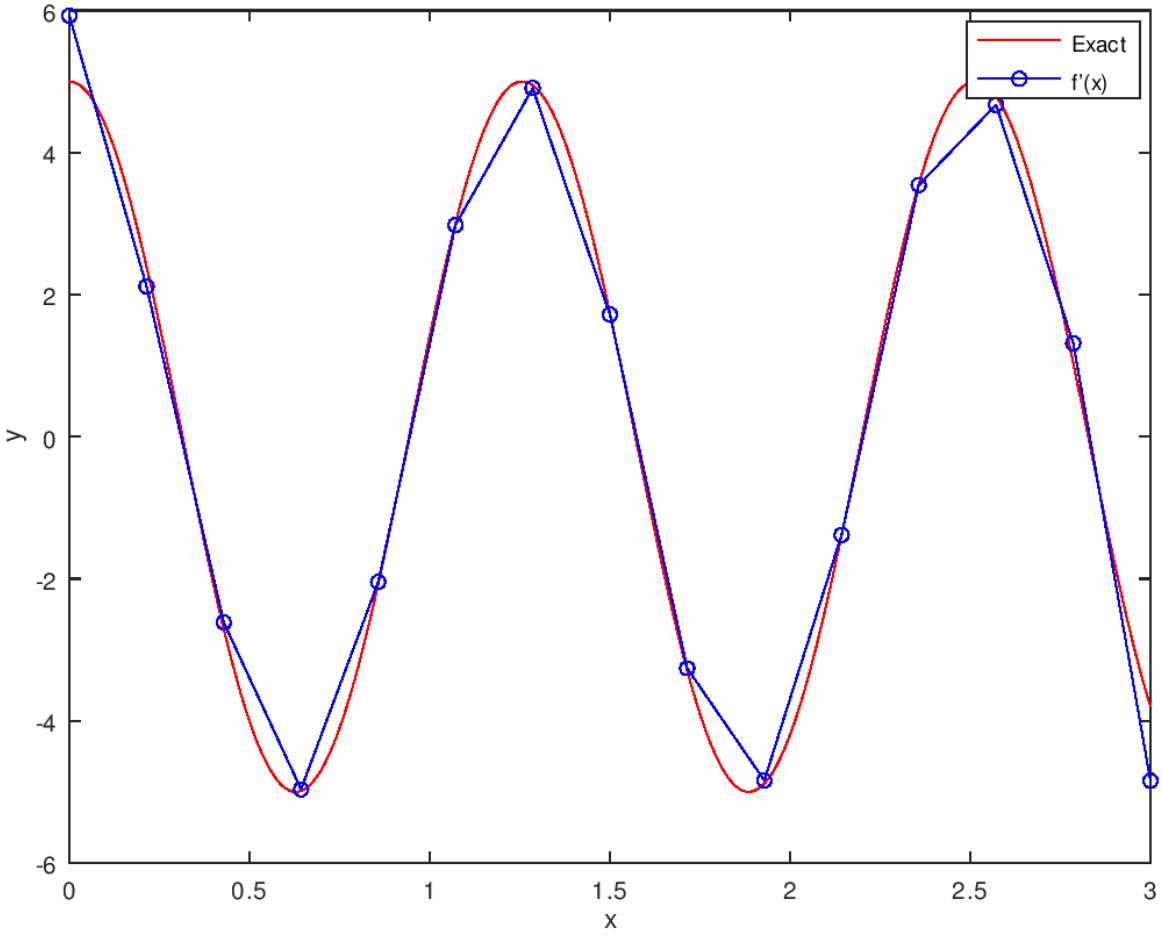

Exact
2nd O Central
4th O Central
4th O Pade
k'h
kh
0
0.5
1
1.5
2
2.5
3
3.5

C.2 solution

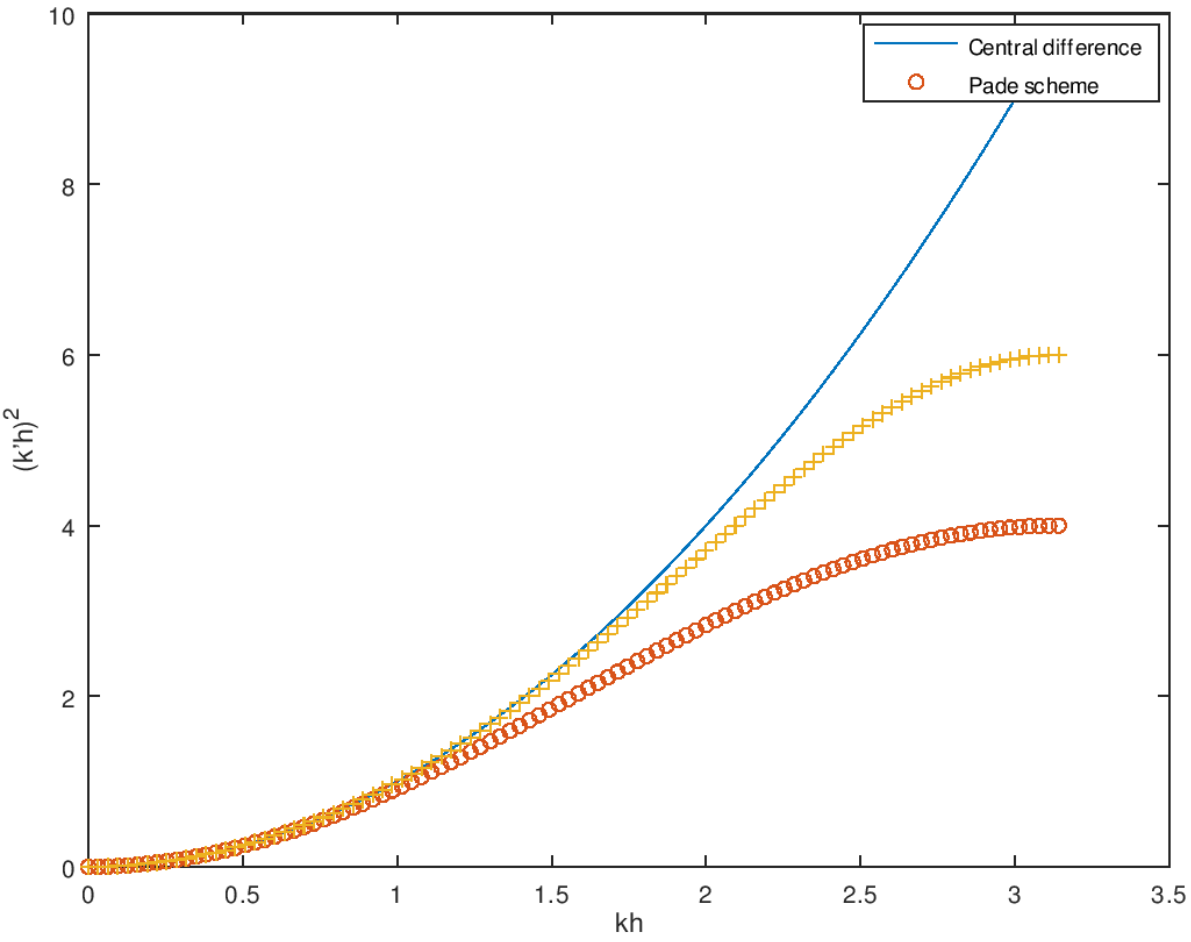
b = f’(xj) =

5.9252
2.1151
-2.6147
-4.9636
-2.0469
2.9785
4.9061
1.7187
-3.2601
-4.8391
-1.3819
3.5432
4.6726
1.3155
-4.8443

(j=0,1,2,…,14)



D.4 solution


Central difference
Pade scheme
(k'h)^2
kh
0
2
4
6
8
10
0
0.5
1
1.5
2
2.5
3
3.5