TABLE OF EXACT DERIVATES AT X = 1.5

ORDER	ANALYTICAL
First	-1.110721
Second	-1.744716
Third	2.740594
Fourth	4.304914

TABLE OF NUMERICAL DERIVATIVES AT DIFFERENT dx AND %ERROR

	FIRST DERIVATIVE		SECOND DERIVATIVE		THIRD DERIVATIVE		FOURTH DERIVATIVE	
dx	Numerical	%Error	Numerical	%Error	Numerical	%Error	Numerical	%Error
0.0005	-1.110721	-0.000	-1.744716	-0.000	2.740593	-0.000	4.298784	-0.142
0.0010	-1.110720	-0.000	-1.744716	-0.000	2.740592	-0.000	4.305001	0.002
0.0100	-1.110675	-0.004	-1.744680	-0.002	2.740425	-0.006	4.304737	-0.004
0.1000	-1.106159	-0.411	-1.741132	-0.205	2.723730	-0.615	4.287244	-0.410
0.2000	-1.092540	-1.637	-1.730413	-0.820	2.673636	-2.443	4.234623	-1.633
0.3000	-1.070066	-3.660	-1.712667	-1.837	2.591782	-5.430	4.148212	-3.640
0.4000	-1.039067	-6.451	-1.688067	-3.247	2.480553	-9.488	4.029902	-6.388

The exact derivatives are calculated in the code. Below are their formulas:

$$\frac{\partial f}{\partial x} = \frac{\pi}{2}\cos\left(\frac{\pi x}{2}\right)$$

$$\frac{\partial^2 f}{\partial x^2} = \frac{-\pi^2}{4}\sin\left(\frac{\pi x}{2}\right)$$

$$\frac{\partial^3 f}{\partial x^3} = \frac{-\pi^3}{8}\cos\left(\frac{\pi x}{2}\right)$$

$$\frac{\partial^4 f}{\partial x^4} = \frac{\pi^4}{16}\sin\left(\frac{\pi x}{2}\right)$$