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Language: Java

Development Platform: Eclipse

Operating System: MacOS

Prob.1.

$h$	Error in $f'(x=l)$ by Eq. (1) where $f(x) = x^2$	Error in $f'(x=l)$ by Eq. (1) where $f(x) = x^2 + 10^8$	Error in $f'(x=l)$ by Eq. (2) where $f(x) = x^2$	Error in $f'(x=l)$ by Eq. (2) where $f(x) = x^2 + 10^8$
$10^{-1}$	$1.000 * 10^{-1}$	$1.000 * 10^{-1}$	$5.000 * 10^{-3}$	$5.000 * 10^{-3}$
$10^{-2}$	$1.000 * 10^{-2}$	$1.000 * 10^{-2}$	$5.000 * 10^{-5}$	$4.979 * 10^{-5}$
$10^{-3}$	$1.000 * 10^{-3}$	$1.000 * 10^{-3}$	$5.000 * 10^{-7}$	$2.527 * 10^{-6}$
$10^{-4}$	$1.000 * 10^{-4}$	$6.693 * 10^{-5}$	$5.000 * 10^{-9}$	$-2.032 * 10^{-5}$
$10^{-5}$	$1.000 * 10^{-5}$	$-1.271 * 10^{-4}$	$5.100 * 10^{-11}$	$-1.321 * 10^{-4}$
$10^{-6}$	$1.000 * 10^{-6}$	$-1.622 * 10^{-3}$	$1.500 * 10^{-12}$	$1.622 * 10^{-3}$
$10^{-7}$	$1.005 * 10^{-7}$	$-3.142 * 10^{-2}$	$2.876 * 10^{-11}$	$3.142 * 10^{-2}$
$10^{-8}$	$-1.077 * 10^{-9}$	$-2.549 * 10^{-1}$	$-3.302 * 10^{-9}$	$2.549 * 10^{-1}$
$10^{-9}$	$8.324 * 10^{-8}$	-1.000	$2.723 * 10^{-8}$	-1.0
$10^{-10}$	$8.279 * 10^{-8}$	-1.000	$8.274 * 10^{-8}$	-1.0
$10^{-11}$	$8.275 * 10^{-8}$	-1.000	$8.274 * 10^{-8}$	-1.0
$10^{-12}$	$8.890 * 10^{-5}$	-1.000	$3.339 * 10^{-5}$	-1.0
$10^{-13}$	$-7.993 * 10^{-4}$	-1.000	$-2.442 * 10^{-4}$	-1.0
$10^{-14}$	$-7.993 * 10^{-4}$	-1.000	$-7.993 * 10^{-4}$	-1.0
$10^{-15}$	$1.102 * 10^{-1}$	-1.000	$5.471 * 10^{-2}$	-1.0
$10^{-16}$	-1.0	-1.0	$-0.445 * 10^{-1}$	-1.0
$10^{-17}$	-1.0	-1.0	-1.0	-1.0
$10^{-18}$	-1.0	-1.0	-1.0	-1.0

Prob. 2.

$h$	Error in $f''(x=l)$ by Eq. (3)	Error in $f''(x=l)$ by Eq. (4)	Error in $f''(x=l)$ by Eq. (5)	$\eta$ by Eq. (6)	$\eta$ by Eq. (7)
$2^{-4}$	$6.380 * 10^{-2}$	$1.302 * 10^{-1}$	$-1.302 * 10^{-3}$	2.040816	2.117647
$2^{-5}$	$3.158 * 10^{-2}$	$6.380 * 10^{-2}$	$-3.255 * 10^{-4}$	2.020619	2.060606
$2^{-6}$	$1.571 * 10^{-2}$	$3.158 * 10^{-2}$	$-8.138 * 10^{-5}$	2.010363	2.030769
$2^{-7}$	$7.832 * 10^{-3}$	$1.571 * 10^{-2}$	$-2.035 * 10^{-5}$	2.005194	2.015504
$2^{-8}$	$3.911 * 10^{-3}$	$7.833 * 10^{-3}$	$-5.086 * 10^{-6}$	2.002601	2.007782
$2^{-9}$	$1.954 * 10^{-3}$	$3.911 * 10^{-3}$	$-1.272 * 10^{-6}$	2.001301	2.003899
$2^{-10}$	$9.769 * 10^{-4}$	$1.954 * 10^{-3}$	$-3.179 * 10^{-7}$	2.000651	2.001951
$2^{-11}$	$4.884 * 10^{-4}$	$9.769 * 10^{-4}$	$-7.948 * 10^{-8}$	2.000325	2.000976
$2^{-12}$	$2.442 * 10^{-4}$	$4.884 * 10^{-4}$	$-1.987 * 10^{-8}$	2.000163	2.000488
$2^{-13}$	$1.221 * 10^{-4}$	$2.442 * 10^{-4}$	$-4.967 * 10^{-9}$	2.000081	2.000244
$2^{-14}$	$6.104 * 10^{-5}$	$1.221 * 10^{-4}$	$-1.242 * 10^{-9}$	2.000041	2.000122
$2^{-15}$	$3.052 * 10^{-5}$	$6.104 * 10^{-5}$	$-3.104 * 10^{-10}$	2.000020	2.000061
$2^{-16}$	$1.526 * 10^{-5}$	$3.052 * 10^{-5}$	$-7.761 * 10^{-11}$	2.000010	2.000031

$2^{-17}$	$7.629 * 10^{-6}$	$1.526 * 10^{-5}$	$-1.940 * 10^{-11}$	2.000005	2.000015
$2^{-18}$	$3.815 * 10^{-6}$	$7.629 * 10^{-6}$	$4.851 * 10^{-12}$	2.000005	2.000005
$2^{-19}$	$1.907 * 10^{-6}$	$3.815 * 10^{-6}$	$1.213 * 10^{-12}$	2.0	2.000010
$2^{-20}$	$9.537 * 10^{-7}$	$1.907 * 10^{-6}$	$3.032 * 10^{-13}$	2.0	2.0
$2^{-21}$	$4.768 * 10^{-7}$	$9.536 * 10^{-7}$	$7.579 * 10^{-14}$	2.0	2.0
$2^{-22}$	$2.384 * 10^{-7}$	$4.768 * 10^{-7}$	$1.894 * 10^{-14}$	2.0	2.0
$2^{-23}$	$1.192 * 10^{-7}$	$2.384 * 10^{-7}$	$4.737 * 10^{-15}$	2.0	2.0
$2^{-24}$	$5.960 * 10^{-8}$	$1.192 * 10^{-7}$	$1.184 * 10^{-15}$	2.0	2.0
$2^{-25}$	$2.980 * 10^{-8}$	$5.960 * 10^{-8}$	$2.961 * 10^{-16}$	2.0	2.0
$2^{-26}$	$1.490 * 10^{-8}$	$2.980 * 10^{-8}$	0.0	2.0	2.0
$2^{-27}$	0.0	$1.490 * 10^{-8}$	$-1.987 * 10^{-8}$	-Inf	1.0
$2^{-28}$	0.0	0.0	0.0	NaN	Inf
$2^{-29}$	0.0	0.0	0.0	NaN	NaN
$2^{-30}$	0.0	0.0	0.0	NaN	NaN
$2^{-31}$	0.0	0.0	0.0	NaN	NaN
$2^{-32}$	0.0	0.0	0.0	NaN	NaN
$2^{-33}$	0.0	0.0	0.0	NaN	NaN
$2^{-34}$	0.0	0.0	0.0	NaN	NaN
$2^{-35}$	0.0	0.0	0.0	NaN	NaN
$2^{-36}$	0.0	0.0	0.0	NaN	NaN
$2^{-37}$	0.0	0.0	0.0	NaN	NaN
$2^{-38}$	0.0	0.0	0.0	NaN	NaN
$2^{-39}$	0.0	0.0	0.0	NaN	NaN
$2^{-40}$	0.0	0.0	0.0	NaN	NaN