

TEXAS INSTRUMENTS
 Calculator Products Division

Submission Abstract

Program Title FUNCTION AND DERIVATIVES	Rev.
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Abstract of Program

This program allows input of any desired function and evaluation of the function and its first two derivatives at any desired value of X.

Original SR-52 Program by Richard M. Williams of Corvallis, Oregon.

User Benefits:

Allows quick evaluation of complex functions, whose derivatives may be even more complex.

Category Number <u>39</u>	Required Progs. _____	Prog. Steps <u>137</u>	PC-100A Needed <input type="checkbox"/> Library Module ID _____ <input type="checkbox"/>
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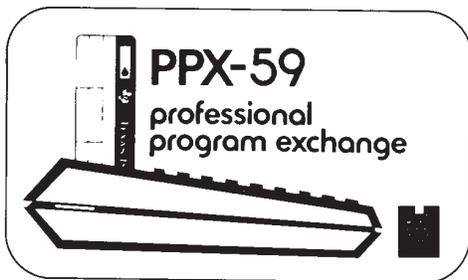
Submission Checklist

- Recorded Magnetic Cards
- Submission Abstract
- Program Description
- User Instructions
- Sample Problem
- Listing
- _____
- _____

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Program Description

Program Title:

FUNCTION AND DERIVATIVES

Rev.

Method, Equations, Sketches, Limitations, References, Error Recovery:

This program allows input of any desired function with subsequent evaluation of the function and its first two derivatives at any value of the independent variable. The function is user defined in the LRN mode. The derivatives are calculated from:

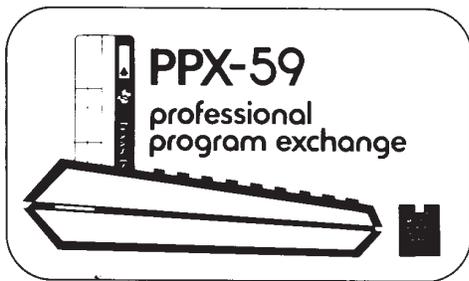
$$\frac{df}{dx}(x) = \frac{F(X(1+\delta)) - F(X(1-\delta))}{2 \times \delta}$$

$$\text{and } \frac{d^2F}{dx^2}(x) = \frac{F(X(1+2\delta)) - 2(F(X) + F(X(1-2\delta)))}{4\delta^2}$$

where: $F(X)$ = user defined function

δ = incremental step = $\Delta \approx .01$

Note: $x = 0$ not allowed



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Sample Problem

Statement of Example
let $F(x) = x + e^{-x^2}$

evaluate $F(x)$, $\frac{df}{dx}$, $\frac{d^2f}{dx^2}$ at $x = .01$ and 1 . with $\Delta = .01$

☐ See Continuation Sheet

ENTER	PRESS	OUTPUT/MODE (see legend below)	COMMENT
	GTO E		
	LRN	137 00	Input
	(CE +	140 00	Desired
	X ² +/-Inv	143 00	Function
	Inx) rtn	146 00	F(x)
	LRN	0	
0.01	A	0.01* (Δ)*	enter Δ
0.01	B	0.01* (x)*	enter x = 0.01
	C'	1.009900005	F(x) at .01
	C	0.980002* (D1)*	df/dx at .01
	D	-1.9994* (D2)*	d ² f/dx ² at .01
1	B	1.* (x)*	enter x = 1
	C'	1.367879441	F(x) at 1
	C	.2642656432* (D1)*	df/dx at 1
	D	0.73551366* (D2)*	d ² F/dx ² at 1

Modes: n* - Printed only (n) - Displayed Briefly (Pause)
in* - Printed and displayed

☐ Over