

DoEasy-Horner-Algorithm.

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for HP40G and compatible Calculators

This program shows you the Horner-Calculation of polynominal function-values.
In case of $f(x)=0$ the program displays the facorized polynom-function of the entered function.
For example:

$ax^3 + bx^2 + cx + d$; $x = \text{root}$ ----> $(x-\text{root})(ux^2+vx + p)$

including :

english version 1.0
german version 1.0

installation :

Use HPGComm 2.0 or something to transfer..
copy all files to "work"-directory, and press recieve
in the PROGRAM view of the calculator.
Select DISCDRIVE and in the next menu
"DoEasy-Horner". If it doesn't apear, check the
HPGComm-configuration!

understanding the program :

easier as it seems like.

example :

$$\begin{aligned}x &= 2 ; y = ? \\y &= 3.2x^3 + 2x^2 + 5.1x + 10 \\&= (ax^3 + bx^2+ cx + d) \\&= (((a)*x+b)*x+c)*x+d\end{aligned}$$

horner-algorithm :

	a	b	c	d
	3.2	2	5	10
	+	+	+	+
		6.4	16.8	43.6
*2 -----	3.2	8.4	21.8	53.6
X				=====
				y = 53.6

you see, there are really little calculationvalues in this method

to do this calculation with the program you have to do following :

1. enter highest function degree (..in this case it is 3 for x^3)
 - now the program knows, how much coefficients it have to ask for.
2. enter the x-value (in this case it is $x=2$)
3. after that enter the coefficients step by step.. the lower helptext will give you advice which one you have to enter.
 - now the program calculate a matrix in the upper shown pattern.
 - after calculation it goes to the Matrixeditor, so pay attention, it is only for looking and writing down the result on your paper.
 - first column for the searched x-value
 - first row for the coefficients
 - under them the calculated values
 - the last value represent the result
 - after pressing OK the program display's the last value again and quit the program. (if the result isn't zero !)

IF THE RESULT IS ZERO :

the DoEasy-Horner-Algorithm isn't only good for easy calculate the results of functions at specified points, in the way the teacher want it. the horner-method can also represent a really good alternative way for polynomdivisions like the following one ..

$$f(x) = -1x^3 + 5x^2 - 3x - 9 = 0 \quad ; \quad x = 3$$

$$f(x) = A * (x - 3) \leftarrow \text{linear factor } A*(3 - 3) = 0$$

$$A = ?$$

to factorise you need to divide :

$$(-1x^3 + 5x^2 - 3x - 9) / (x - 3) = A = ?$$

the DoEasy-Horner-Algorithm can give you the result easy as it can gives you the value of a function..

when you calculate a x-value with a zero-result. the program automatically activate the polynomial evaluation.. what means :

1. enter the function $(-1x^3 + 5x^2 - 3x - 9)$ in the before shown way.
- power, coefficients..
2. the x-value is in this case $x = 3$, to get a zero result of the function, and have to be entered.

	a	b	c	d
	-1	5	-3	-9
	+	+	+	+
x		-3	6	9
*3	---	-1	2	3
				0
				=====

$$y = 0$$

(on the calculator is looks like a matrix)

3. when you look on the last row at the calculated values $(-1 ; 2 ; 3)$. This are the searched coefficients of the polynomial division remaining polynome.. with a lower power.

$$(-1x^3 + 5x^2 - 3x - 9) / (x - 3) = (-1x^2 + 2x + 3)$$

result :

$$(-1x^2 + 2x + 3) * (x - 3)$$

4. after pressing OK in the Matrixedior the programm will display you the Result in polynominal form.

For full view, the result is split in one argument per displayline. it will look's like that :

$$\begin{array}{l} (-1x^2 \\ +2x \\ +3) \\ *(x-3) \end{array}$$

a little ugly, but after short training the displaying is quiet understandable and gives the ability to show you much larger result's as in this little example.

I made this program for people like me, who always get little errors in their calculations and are looking for quickly help in specific problems. So I hope you can also get use of this program, like I got of, especially when the teacher ask for.

watch out for more upcoming useful DoEasy-program's ..

**if you have any questions or advises or something like that..
send me a mail ..> lilaleben@hotmail.com**