FUNCTION DEFINED BY PRESET CONDITIONS V1.3

This program finds for a function f(x) of nth degree (2 <= n <= 4) given as

f(x) = a\*xn + b\*xn-1 + c\*xn-2 + …. the numerical values of the unknown coefficients a, b, c, … owing to preset conditions. If n is keyed in negative (-4 <= n <= -2), a is set to 1:

f(x) = xn + b\*xn-1 + c\*xn-2 + … .

These conditions to define the function may be (*type 1*): a given point P(x|y) on the graph of a function f(x), (*type 2*): extremum or tangent in x for f´(x), (*type 3*): point of inflexion in x as f´´(x) = 0 ( f´´(x) <> 0 is also possible ) or (*type 4*): the integral I (x) = Int( f(x), xlower, xupper) between two points x,lower and x,upper.

Select FINDFUNC . Then choose FindFunc and press Enter. Fill into the brackets the degree *2*, *3* or *4* of the function looked for. Now the program prompts (n+1)-times for the input of xi (=x,lower for *type 4* ), yi and x,upper . This last one is set to *0* and is only important for *type* *4* in the next prompt for the type of the function. In this case the input is read as yi = Int(f(x,upper - f(x,lower)). After all entries are done the result is given as function with numerical quantities for a, b, c… in exact and standard form including all pre-set conditions made. Now press “Enter” to open the symbolic view of the Function-App. Mark F1(X), which contains the calculated function f(x), and press the Plot-key to depict the graph of f(x).

EXAMPLE:

The graph of a function of 3rd degree intersects the y-axis at y=3.6, has a point of inflection at x=5/3 and a maximum at x=10/3. The integral (area) within the interval x=0 and x=6 is 25.2 . Find the numerical form of f(x).

Start FindFunc and enter 3 for the degree: FindFunc(3) “Enter”.

The first indication made is: (0|3.6) is point of f(x). Thus the next input has to be:

xi=0, yi=3.6, x\_u=0 (Default!). Press OK, then choose f(x) or press 1.

In a point of inflexion, f’’(x)=0 applies, so enter next:

xi=5/3, yi=0, x\_u=0. Press OK and select f’’(x) or press 3.

In x=10/3 the gradient of the tangent f’(x) is 0 (extremum!), so the following entry is:

xi=10/3, yi=0, x\_u=0. Press OK and select f’(x) or press 2.

And at last, the integral within x\_l = 0 and x\_u = 6 being 25.2 requires:

xi=0, yi=25.2, x\_u=6. Press OK and select int(f(x)) or press 4.

The result is displayed as:

---F(x)= -1/10\*x3 + 1/2\*x2 + 0\*x + 18/5

= - 0.1\*x3 + 0.5\*x2 + 0\*x +3.6

Now press „Enter“ to see the graph of F1(X) = F(x).

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