INTEGR

INTEGR returns the integrated value of a function in a **two-dimensional** space

Syntax

1. INTEGR(Pno%, 2, "ColLab$_1", "ColLab$_2", Mode%=0,1 or 2, X_from, X_to)
2. INTEGR(0, Npoints%, x_1, y_1, x_2, y_2,…, x_n, y_n, , Mode%=0,1 or 2, X_from, X_to)
3. INTEGR(@ObjFn(..), 2, @ObjColPar_1, @ObjColPar_2, Mode%=0,1 or 2, X_from, X_to)
4. INTEGR(Telitab$, 2, "ColLab$_1", "ColLab$_2", Mode%=0,1 or 2, X_from, X_to)

Arguments

- Pno% is the number that refers to the TeLiTab sets in the Data slot. Pno% should be an integer value or a parameter which is assigned an integer value and is the number of the TeLiTab set in the expressions' data slot.
- Npoints% is the number of points (x,y) that are given in direct definition.
- @ObjFn() refers to the Object from which data will be used.
- TeLiTab$ refers to the string parameter that contains the TeLiTab.
- "ColLab$_1" and @ObjColPar_1 refer to the column that will be used as the parameter X in the integration.
- "ColLab$_2" and @ObjColPar_2 refer to the column that will be used as the parameter Y in the integration.
- Mode% is the mode of integration:
    - Mode% =0 Riemann
    - Mode% = 1 Trapezium
    - Mode% =2 Simpson.
- X_from and X_to are the parameters between wich will be integrated.

Remarks

1. See also Telitab access for a generic description on the use of TeLiTab data
2. Similar to other Data analysis functions, the DISINT is a convenient way to evaluate data. Please also look at these functions for syntax examples
3. INTEGR computes the integral from x=x_from to x=x_to using either:

- Mode%=0 -> Riemann (bar-wise) integration
- Mode%=1 -> Trapezium rule
- Mode%=2 -> Simpson rule

1. x_from and x_to should be within the limits of the Telitab data provided
2. Integration can only be performed in 2D space. Multi-dimensional integration is not (yet) implemented (Ndim% = 2). Multi-dimensional integration can be performed by nested INGER() functions.
3. Please realise the dataset provided to INTEGR should be a function. Every x-value should have one y-value.

Examples

Example 1: Telitab in dataslot

In this example, syntax 1 is used.
Let y be defined by

y= INTEGR(1, 2, "XC", "YC", 0, x_1, x_2)

This is the command for a Riemann integral between x_1 and x_2, using the points of the curve in the Dataslot.
The following Telitab set is placed in the Data slot:

```
|INTEGR1|
   0
   2 "XC" "YC"
   "1" 1 1
   "2" 2 4
   "3" 3 9
   "4" 4 16
   "5" 5 25
   "6" 6 36
   "7" 7 49
   "8" 8 64
   "9" 9 81
   "10" 10 100|
```

For x_1 = 2.5 and x_2=5, this relation returns

y=28.25.

Remark

In case you apply the symbolic addressing of the columns for the description of the point on the curve or surface to compute the differential for, e.g. "Par_x" and "Par_y", please make sure that your Telitab set contains these names. If not, an error message is generated and the calculation is stopped.

Example 2: Direct Definition

This example will illustrate syntax 2.
In direct definition, the points of the curve are stated in the Relation itself:

INTEGR(Pno%, Npoints%, x_1, y_1, x_2, y_2,…, x_n, y_n, Mode%=0,1 or 2, X_from, X_to)

If Pno%=0 then all x_i and y_i values should be numeric expressions. The minimum number of x,y data points Npoints% in the list is 2 in which case the interpolation (and differentiation) is performed linear.
Let y be defined by

y = INTEGR(0, 4, 1, 1, 2, 4, 3, 9, 4, 16, 1, x_1, x_2)

For x_1=2.5 and x_2=5, this relation returns

y=28.25

Example 3: TeLiTab in object or string

Syntax 3 and 4 are similar to syntax 1, but now existing telitabs are used instead of the dataslot.

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