

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 which 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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