# TANH

## PURPOSE

Compute the hyperbolic tangent for a variable or parameter.

## DESCRIPTION

The hyperbolic tangent is defined as:

$$\tanh(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} \qquad \textbf{(EQ 7-112)}$$

The hyperbolic tangent is defined for all real numbers. The range is -1 to 1.

## SYNTAX

LET <y2> = TANH(<y1>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a number, parameter, or variable;

<y2> is a variable or a parameter (depending on what <y1> is) where the computed hyperbolic cotangent value is stored;

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

## EXAMPLES

LET A = TANH(-2)
LET A = TANH(A1)
LET X2 = TANH(PI/2)

## DEFAULT

None

## SYNONYMS

None

## RELATED COMMANDS

| | | |
|---|---|---|
| TAN | = | Compute tangent. |
| SINH | = | Compute hyperbolic sine. |
| COSH | = | Compute hyperbolic cosine. |
| COTH | = | Compute hyperbolic cotangent. |
| SECH | = | Compute hyperbolic secant. |
| CSCH | = | Compute hyperbolic cosecant. |
| ARCCOSH | = | Compute hyperbolic arccosine. |
| ARCCOTH | = | Compute hyperbolic arccotangent. |
| ARCCSCH | = | Compute hyperbolic arccosecant. |
| ARCSECH | = | Compute hyperbolic arcsecant. |
| ARCSINH | = | Compute hyperbolic arcsine. |
| ARCTANH | = | Compute hyperbolic arctangent. |

## APPLICATIONS

Trigonometry

## IMPLEMENTATION DATE

Pre-1987

PROGRAM

```
TITLE TANH(X) FOR X = -3 TO 3
X1LABEL X
Y1LABEL TANH(X)
YLIMITS -1 1
YTIC OFFSET 0.1 0.1
PLOT TANH(X) FOR X = -3 0.01 3
LINE DOTTED
MOVEDATA -3 1
DRAWDATA 3 1
MOVEDATA -3 -1
DRAWDATA 3 -1
```