MODEL Math

The present model defines a set of standard functions in the field of mathematics, as a basis for further consistency conditions.

add()

Adds two numbers (a+b).

```
FUNCTION add(a: NUMERIC; b: NUMERIC): NUMERIC;
```

sub()

Subtracts two numbers (a-b).

```
FUNCTION sub(a: NUMERIC; b: NUMERIC): NUMERIC;
```

mul()

Multiplies two numbers (a*b).

```
FUNCTION mul(a: NUMERIC; b: NUMERIC): NUMERIC;
```

div()

Divides two numbers (a/b).

```
FUNCTION div(a: NUMERIC; b: NUMERIC): NUMERIC;
```

abs()

Calculates the absolute value of a number.

```
FUNCTION abs(a: NUMERIC): NUMERIC;
```

acos()

Calculates the arc cosine of a number.

```
FUNCTION acos(a: NUMERIC): NUMERIC;
```

asin()

Calculates the arc sine of a number.

```
FUNCTION asin(a: NUMERIC): NUMERIC;
```

atan()

Calculates the arctangent of a number.

```
FUNCTION atan(a: NUMERIC): NUMERIC;
```

atan2()

Calculates the angle whose tangent is the quotient of two given numbers.

```
FUNCTION atan2(ordinate: NUMERIC; abscissa: NUMERIC): NUMERIC;
```

cbrt()

Calculates the third root (cubic root) of a number.

```
FUNCTION cbrt(a: NUMERIC): NUMERIC;
```

cos()

Calculates the cosine of a number.

```
FUNCTION cos(a: NUMERIC): NUMERIC;
```

cosh()

Calculates the hyperbolic cosine of a number.

```
FUNCTION cosh(a: NUMERIC): NUMERIC;
```

exp()

Calculates the value of e raised to the specified exponent (e**a).

```
FUNCTION exp(a: NUMERIC): NUMERIC;
```

hypot()

Calculates the hypotenuse (sqrt(a*a+b*b))

```
FUNCTION hypot(a: NUMERIC; b: NUMERIC): NUMERIC;
```

log()

Calculates the natural logarithm (to base e) of a number.

```
FUNCTION log(a: NUMERIC): NUMERIC;
```

log10()

Calculates the logarithm (to base 10) of a number.

```
FUNCTION log10(a: NUMERIC): NUMERIC;
```

pow()

Calculates the power of a number with the specified exponent (a**b).

```
FUNCTION pow(a: NUMERIC; b: NUMERIC): NUMERIC;
```

round()

Rounds the given number.

```
FUNCTION round(a: NUMERIC): NUMERIC;
```

signum()

Calculates the sign of a number.

```
FUNCTION signum(a: NUMERIC): NUMERIC;
```

sin()

Calculates the sine of a number.

```
FUNCTION sin(a: NUMERIC): NUMERIC;
```

sinh()

Calculates the hyperbolic sine of a number.

```
FUNCTION sinh(a: NUMERIC): NUMERIC;
```

sqrt()

Calculates the second root (square root) of a number.

```
FUNCTION sqrt(a: NUMERIC): NUMERIC;
```

tan()

Calculates the tangent of a number.

```
FUNCTION tan(a: NUMERIC): NUMERIC;
```

tanh()

Calculates the hyperbolic tangent of a number.

```
FUNCTION tanh(a: NUMERIC): NUMERIC;
```

max()

Calculates the maximum value of two numbers.

```
FUNCTION max(a: NUMERIC; b: NUMERIC): NUMERIC;
```

min()

Calculates the minimum value of two numbers.

```
FUNCTION min(a: NUMERIC; b: NUMERIC): NUMERIC;
```

avg()

Calculates the average value of a set of numbers. The attribute path can be used to identify an attribute within a structural element.

```
FUNCTION avg(attributePath: TEXT): NUMERIC;
```

Example:

```
STRUCTURE StructA =
  attrA : 1..20;
END StructA;

CLASS ClassB =
  attrb : BAG OF StructA;
  MANDATORY CONSTRAINT Math.avg("THIS->attrb->attrA")<5.0;
END ClassB;
```

This constraint checks whether the average value of AttrA within an object of class ClassB is less than 5.0. If the average value of AttrA in all objects of class ClassB is less than 5.0, you could use the following constraint:

```
SET CONSTRAINT Math.avg("ALL->attrb->attrA")<5.0;
```

max2()

Calculates the maximum value of a set of numbers. The attribute path can be used to identify an attribute within a structural element.

```
  FUNCTION max2(attributePath: TEXT): NUMERIC;
```

min2()

Calculates the minimum value of a set of numbers. The attribute path can be used to identify an attribute within a structural element.

```
  FUNCTION min2(attributePath: TEXT): NUMERIC;
```

sum()

Calculates the sum of a set of numbers. The attribute path can be used to identify an attribute within a structural element.

```
  FUNCTION sum(attributePath: TEXT): NUMERIC;
```

Attachment A

```
INTERLIS 2.3;

CONTRACTED TYPE MODEL Math (en) AT "http://www.interlis.ch/models"
  VERSION "19/11/2018" =

  FUNCTION add(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION sub(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION mul(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION div(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION abs(a: NUMERIC): NUMERIC;
  FUNCTION acos(a: NUMERIC): NUMERIC;
  FUNCTION asin(a: NUMERIC): NUMERIC;
  FUNCTION atan(a: NUMERIC): NUMERIC;
  FUNCTION atan2(ordinate: NUMERIC; abscissa: NUMERIC): NUMERIC;
  FUNCTION cbrt(a: NUMERIC): NUMERIC;
  FUNCTION cos(a: NUMERIC): NUMERIC;
  FUNCTION cosh(a: NUMERIC): NUMERIC;
  FUNCTION exp(a: NUMERIC): NUMERIC;
  FUNCTION hypot(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION log(a: NUMERIC): NUMERIC;
  FUNCTION log10(a: NUMERIC): NUMERIC;
  FUNCTION pow(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION round(a: NUMERIC): NUMERIC;
  FUNCTION signum(a: NUMERIC): NUMERIC;
  FUNCTION sin(a: NUMERIC): NUMERIC;
  FUNCTION sinh(a: NUMERIC): NUMERIC;
  FUNCTION sqrt(a: NUMERIC): NUMERIC;
  FUNCTION tan(a: NUMERIC): NUMERIC;
  FUNCTION tanh(a: NUMERIC): NUMERIC;
  FUNCTION max(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION min(a: NUMERIC; b: NUMERIC): NUMERIC;
  FUNCTION avg(attributePath: TEXT): NUMERIC;
  FUNCTION max2(attributePath: TEXT): NUMERIC;
  FUNCTION min2(attributePath: TEXT): NUMERIC;
  FUNCTION sum(attributePath: TEXT): NUMERIC;

END Math.
```