NAME

MathUtil

SYNOPSIS

use MathUtil;

use MathUtil qw(:all);

DESCRIPTION

MathUtil module provides a variety of common math functions not available in core Perl package or some other useful math utilities. In order to be consistent with other Perl functions, name of all the functions in this package are in lowercase which differs from MayaChemTools naming convention for function names.

MathUtil module provides the following functions:

GeneratePrimeNumbersUpToCount, GeneratePrimeNumbersUpToLimit, acos, asin, ceil, floor, log10, max, min, random, round, srandom, tan

FUNCTIONS

GeneratePrimeNumbersUpToCount

```
$PrimesRef = GeneratePrimeNumbersUpToCount();
$PrimesRef = GeneratePrimeNumbersUpToCount($Count);
```

Generate prime numbers up to specified *Count* of prime numbers and return a reference to an array containing the prime numbers.

By default, the first 1000 prime numbers are generated. The 1000th prime number is 7919.

The algorithm to generate prime numbers is a modification of Sieve of Erastothenes prime number generator.

GeneratePrimeNumbersUpToLimit

```
$PrimesRef = GeneratePrimeNumbersUpToLimit();
$PrimesRef = GeneratePrimeNumbersUpToLimit($Limit);
```

Generate prime numbers up to a specified *Limit* and return a reference to an array containing the prime numbers.

By default, the first 1000 prime numbers are generated. The 1000th prime number is 7919 and that's why default limit is set to 7920.

The algorithm to generate prime numbers is a modification of Sieve of Erastothenes prime number generator.

acos

```
$Value = acos($AngleInRadians);
```

Returns the nverse cosine of an angle expressed in *Radians* using Math::Trig::acos function.

asin

```
$Value = asin($AngleInRadians);
```

Returns the inverse sine of an angle expressed in *Radians* using Math::Trig::asin function.

ceil

```
$IntegerValue = ceil($Value);
```

Returns the next largest integer for *Value* using POSIX::ceil function.

floor

```
$IntegerValue = floor($Value);
```

Returns the previous smallest integer for *Value* using POSIX::floor function.

log10

```
$Log10Value = log10($Value);
```

Returns the log of *Value* using base 10.

max

```
$Number = max($Number1, $Number2);
```

Returns a Number corresponding to the maximum of *Number1* and *Number2*.

min

```
$Number = min($Number1, $Number2);
```

Returns a Number corresponding to the minimum of *Number1* and *Number2*.

round

```
$RoundedValue = round($Number);
$RoundedValue = round($Number, $DecimalPlaces);
```

Returns a value corresponding to a nearst ingeter for *Number* or formatted to *DecimalPlaces*.

random

```
$RandomNumber = random();
$RandomNumber = random($Size);
```

Returns a random number between 0 and less than 1 or specified size.

The random number generator implemented in MayaChemTools is a variant of linear congruential generator (LCG) as described by Miller et al. [Ref 120]. It is also referred to as Lehmer random number generator or Park-Miller random number generator.

Unlike Perl's core random number generator function rand, the random number generator implemented in MayaChemTools generates consistent random values across different platforms - Windows, CygWin, Linux, Unix - for a specific random seed.

srandom

```
$Seed = srandom($Seed);
```

Sets random number seed to be used by <random> function and returns seed value.

The random number seed is recommeded to be an integer between 1 and $2^{**}31 - 2$ [Ref 120] which translates to be 1 and 2147483646.

The default seed is set to 123456789.

tan

```
$Value = tan($AngleInRadians);
```

Returns the tangent of an angle expressed in *Radians*.

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SEE ALSO

Constants.pm, ConversionsUtil.pm

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