# Functions and Operators

## 

## Introduction

Functions modify the value of one or more variables to produce a result (i.e., ROUND(2.33333) produces the value 2).

Operators are used to combine two items (i.e., the + operator combines Var1 and Var2 to produce a sum, as in Var3=Var1+Var2).

Functions and operators appear within commands and are used for common tasks that include extracting a year from a date, combining two numeric values, or testing logical conditions.

Almost all functions require arguments enclosed in parentheses and separated by commas. If arguments are required, do not place any spaces between the function name and the left parenthesis. Syntax rules must be followed. Quotes that must enclose text strings are displayed in question or prompt dialog boxes. Parentheses must enclose arithmetic expressions and can explicitly control the order of operations. Parentheses also enclose function arguments.

### 

### Syntax Notations

The following rules apply when reading this manual and using syntax:

| Syntax | Explanation |
| --- | --- |
| ALL CAPITALS | Epi Info commands and reserved words are shown in all capital letters similar to the READ command. |
| <parameter> | A parameter is information to be supplied to the command. Parameters are enclosed with less-than and greater-than symbols or angle brackets < >. Each valid parameter is described following the statement of syntax for the command. Parameters are required by the command unless enclosed in braces { }. Do not include the < > symbols in the code. |
| [<variable 1>] | Brackets [ ] around a parameter indicates that there can potentially be more than one parameter. |
| {<parameter>} | Braces { } around a parameter indicate that the parameter is optional. Do not include the { } symbols in the code. |
| **|** | The pipe symbol ’|’ is used to denote a choice and is usually used with optional parameters. An example is in the LIST command. You can use the GRIDTABLE or the UPDATE option, but not both. The syntax appears as follows with the pipe symbol between the two options:  LIST {\* EXCEPT} <VarNames> {GRIDTABLE | UPDATE} |
| /\*  \*/ | The combination of backslash and asterisk in the beginning of a line of code and an asterisk and backslash, as shown in some code samples, indicates a comment. Comments are skipped when a program is run. |
| **" "** | Quotation marks must surround all text values as in:  DIALOG "Notice: Date of birth is invalid." |

## Operators

There are various types of operators discussed in this appendix. The following types are provided:

* **Arithmetic Operators** are used to perform mathematical calculations.
* **Assignment Operators** are used to assign a value to a property or variable. Assignment Operators can be numeric, date, system, time, or text.
* **Comparison Operators** are used to perform comparisons.
* **Concatenation Operators** are used to combine strings.
* **Logical Operators** are used to perform logical operations and include AND, OR, or NOT.
* **Boolean Operators** include AND, OR, XOR, or NOT and can have one of two values, true or false.

### 

### Operator Precedence

If several operations occur in an expression, each part is evaluated and resolved in a predetermined order called Operator Precedence. Parentheses can be used to override the order of precedence and evaluate some parts of an expression before others. Operations within parentheses are always performed before those outside. Within parentheses, however, normal Operator Precedence is maintained.

If expressions contain operators from more than one category, arithmetic operators are evaluated first, comparison operators next, and logical operators last. Comparison operators all have equal precedence; they are evaluated in the left-to-right order in which they appear. Arithmetic and logical operators are evaluated in the following order of precedence:

| Arithmetic | Comparison | Logical |
| --- | --- | --- |
| Negation (-) | Equality (=) | NOT |
| Exponentiation (^) | Inequality (<>) | AND |
| Multiplication and division (\*, /) | Less than (<) | OR |
| Integer division (\) | Greater than (>) | XOR |
| Modulus arithmetic (Mod) | Less than or equal to (<=) |  |
| Addition and Subtraction (+, -) | Greater than or equal to (>=) |  |
| String concatenation (&) | IS |  |

If addition and subtraction, multiplication and division, occur together respectively in an expression, each operation is evaluated as it occurs from left to right.

The string concatenation operator (&) is not an arithmetic operator, but in precedence, it does fall after all arithmetic operators and before all comparison operators. The IS operator is an object reference comparison operator. It does not compare objects or their values; it checks only to determine whether two object references refer to the same object.

### & Ampersand

**Description**

This operator forces text string concatenation of two expressions. Text concatenation operator connects or concatenates two values to produce a continuous text value.

**Syntax**

<expression> & <expression>

* The <expression> represents any valid logical expression.

Whenever an expression is not a string, it is converted to a String subtype. If both expressions are Null, the result is Null. However, if only one expression is Null, that expression is treated as a zero-length string ("") when concatenated with the other expression. Any expression that is Empty is also treated as a zero-length string.

**Example**

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE NameVar TEXTINPUT

ASSIGN NameVar=LastName&FirstName

LIST NameVar LastName FirstName

### = Equal Sign

### Description

This operator assigns a value to a variable or property. Comparison operator also used as an equal to; the result of comparison operators is usually a logical value, either true or false.

**Syntax**

<variable> <operator> <value>

* The <variable> represents any variable or any writable property.
* The <value> represents any numeric or string literal, constant, or expression.

**Comments**

The name on the left side of the equal sign can be a simple scalar variable or an element of an array. Properties on the left side of the equal sign can only be those writable properties at run time.

**Example**

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Newvar NUMERIC

ASSIGN Newvar =Age

LIST Newvar Age

### 

### Addition (+)

**Description**

This operator provides the sums of two numbers. Basic arithmetic operator used for addition; the result of an arithmetic operator is usually a numeric value.

**Syntax**

[expression1] <operator> [expression2]

**Comments**

Although the + operator can be used to concatenate two character strings, the & operator should be used for concatenation to eliminate ambiguity and provide self-documenting code. If + operator is used, there may be no way to determine whether addition or string concatenation will occur. The underlying subtype of the expressions determines the behavior of the + operator in the following way:

| **If** | **Then** |
| --- | --- |
| Both expressions are numeric | Add |
| Both expressions are strings | Concatenate |
| One expression is numeric and the other is a string | Add |

If one or both expressions are Null expressions, the result is Null. If both expressions are Empty, the result is an integer subtype. However, if only one expression is Empty, the other expression is returned unchanged as a result.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Newvar NUMERIC

ASSIGN Newvar = Age + 5

LIST Age Newvar

### AND

#### 

#### Description

This operator performs logical conjunction on two Boolean expressions. If both expressions evaluate to True, the AND operator returns True. If either or both expressions evaluate to False, the AND operator returns False.

#### 

#### Syntax

[Logical Expression] AND [Logical Expression]

#### Comments

The expression is any valid logical expression in Epi Info.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Smoke

DEFINE Result TEXTINPUT

IF Age > 75 AND Sex = 2 THEN

ASSIGN Result="Senior"

END

SELECT Result = "Senior"

LIST Result Age Sex

In this case, the value of "Senior" is assigned to all records that meet both criteria Age > 75 and Sex = 2.

### ARITHMETIC

#### Description

These basic arithmetic operators can be used in combination with other commands. The result is a numeric value.

#### Syntax

[Expression] <Operator> [Expression]

* [Expression] is a numeric value or a variable containing data in numeric format.

**Comments**

The results are expressed in numeric format. The basic mathematical operators that can be used in Epi Info are as follows:

* **Addition** + Basic arithmetic operator used for addition; the result of an arithmetic operator is usually a numeric value (example 3 + 3).
* **Subtraction** – Basic arithmetic operator used for subtraction or negation; the result of an arithmetic operator is usually a numeric value (example 3 – 1).
* **Multiplication** \* (Asterisk) Basic arithmetic operator used for multiplication; the result of an arithmetic operator is usually a numeric value.
* **Division /** Basic arithmetic operator used for division; the result of an arithmetic operator is usually a numeric value.
* **Exponentiation ^**
* **Modulus or Remainder MOD**

Arithmetic operators are shown in descending order of precedence. Parentheses can be used to control the order in which operators are evaluated. The default order, however, frequently achieves the correct result.

While it is possible to do date math with dates considered as a number of days (example IncubationDays = SymptomDateTime – ExposureDateTime), the behavior of the database services underlying Epi Info makes it more efficient to use time interval functions (e.g., IncubationDays = MINUTES(ExposureDateTime, Symptom DateTime)/[24\*60]). For doing date math, the following rules apply:

Date + Date produces Date

Date – Date produces Days

Date \* Date not permitted

Date / Date not permitted

Date ^ Date not permitted

Date + Number produces Date

Number + Date produces Number

The last two rules apply as well to other math operations: -, \*, /, ^

The "zero day" for date math is December 30, 1899.

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE var1 NUMERIC

ASSIGN var1=1250 MOD 100

DEFINE var2 NUMERIC

ASSIGN var2=1+1

DEFINE var3 NUMERIC

ASSIGN var3=2-1

DEFINE var4 NUMERIC

ASSIGN var4=1\*1

DEFINE var5 NUMERIC

ASSIGN var5=8/4

DEFINE var6 NUMERIC

ASSIGN var6=5^2

LIST var1 var2 var3 var4 var5 var6

### COMPARISONS

#### 

#### Description

These comparison operators can be used in If, Then, and Select statements in Check Code and Analysis programs. Yes/No variables can only be tested for equality against other Yes/No constants (+), (-), and (.).

| Operator | Description |
| --- | --- |
| = | Equal to Comparison operator used for equal to; the result of comparison operators is usually a logical value, either True or False. EX. A1 = B1 |
| > | Greater than comparison operator. Compares a value greater than another value; the result of comparison operators is usually a logical value, either True or False. Comparison operator used for comparing a value greater than another value; the result of comparison operators is usually a logical value, either True or False. EX. A1 > B1. |
| < | Less than comparison operator. Compares a value less than another value; the result of comparison operators is usually a logical value, either True or False. Comparison operator used for comparing a value less than another value; the result of comparison operators is usually a logical value, either True or False. EX. A1< B1 |
| >= | Greater than or equal to |
| <= | Less than or equal to |
| <> | Not equal to |
| LIKE | Left side variable matches right side pattern; in pattern, ’\*’ matches any number of characters, ’?’ matches any one character. |

#### Syntax

[Expression] <Operator> [Expression]

[Expression] is any valid expression.

#### Comments

Comparison operators are executed from left to right. There is no hierarchy of comparison operators. The <> operator can be used only with numeric variables. For non-numeric variables, use NOT.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

SELECT Age>20

LIST Age Disease

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

SELECT Age<45

LIST Age Disease

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

SELECT Age>=38

LIST Age Disease

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

SELECT Age<>77

LIST Age Disease

### 

### LIKE Operator

#### 

#### Description

This operator is used with the SELECT command to locate subsets of information using a wildcard search. LIKE can be used only to locate data in text variables and uses asterisks (\*) to define the select value. It can also be used to create IF/THEN statements.

#### 

#### Syntax

SELECT <variable> LIKE "\*value\*"

SELECT <variable> LIKE "\*val\*"

SELECT <variable> LIKE "v\*"

SELECT <variable> LIKE "\*v"

* The select variable must be a text type. The value can be a whole or partial text value. Text variables must be enclosed in quotes.

#### 

#### Comments

The results appear in the Output window. Use LIST to view the selected records.

#### 

#### Examples

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE Sick NUMERIC

IF Disease LIKE "h\*" THEN

ASSIGN Sick = 0

END

SELECT Disease LIKE "h\*"

LIST Age Disease DateAdmitted Sick GRIDTABLE

### 

### NOT

#### Description

This operator reverses the True or False value of the logical expression that follows.

#### 

#### Syntax

NOT [Expression]

The expression represents any valid logical expression in Epi Info.

#### 

#### Comments

If the value of an expression is True, NOT returns the value False. If the expression is False, NOT <expression> is True.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE NoVanilla YN

IF NOT Vanilla = (+) THEN

NoVanilla = (+)

ELSE

NoVanilla = (-)

END

FREQ NoVanilla Vanilla

| VANILLA | NOVANILLA |
| --- | --- |
| Yes | No |
| No | Yes |

### OR

#### 

#### Description

This operator returns True if one or the other or both expressions are True. If either expression evaluates to True, OR returns True. If neither expression evaluates to True, OR returns False.

#### 

#### Syntax

[Logical Expression] OR [Logical Expression]

[Logical Expression] represents any valid logical expression in Epi Info.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE IceCream YN

IF VANILLA=(+) OR CHOCOLATE=(+) THEN

IceCream=(+)

ELSE

IceCream=(-)

END

FREQ IceCream

| VANILLA | CHOCOLATE | ICE CREAM |
| --- | --- | --- |
| Yes | Yes | Yes |
| No | Yes | Yes |
| Yes | No | Yes |
| No | No | No |
| Yes | Yes | Yes |

### 

### XOR (eXclusive OR)

#### 

#### Description

This operator performs a logical exclusion on two expressions.

#### 

#### Syntax

[Logical Expression] XOR [Logical Expression]

The [Logical Expression] represents any valid logical expression in Epi Info 7 for Windows.

#### 

#### Comments

If one, and only one, of the expressions evaluates to True, the result is True. However, if either expression is Null, the result is also Null. When neither expression is Null, the result is determined according to the following table:

| If  expression1 is | And expression2 is | Then result is |
| --- | --- | --- |
| True | True | False |
| True | False | True |
| False | True | True |
| False | False | False |

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Oneicecream YN

IF Vanilla = (+) XOR Chocolate = (+) THEN

Oneicecream = (+)

ELSE

Oneicecream = (-)

END

LIST Vanilla Chocolate Oneicecream GRIDTABLE

#### 

## Functions

Do not put a space before the first parenthesis. Functions take the value of one or more variables and return the result of a calculation or transformation.

### 

### ABS Function

#### 

#### Description

The ABS function returns the absolute value of a variable by removing the negative sign, if any.

#### 

#### Syntax

ABS<variable>

* The <variable> can be an existing numeric variable, a defined variable containing numbers, or a numeric constant.

#### 

#### Comments

Results will be numeric.

| Value | ABS Function |
| --- | --- |
| -2 | 2 |
| 1 | 1 |
| 0 | 0 |
| -0.0025 | 0.0025 |

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Age2 NUMERIC

DEFINE Age3 NUMERIC

ASSIGN Age2 = Age \* -1

ASSIGN Age3 = ABS(Age2)

LIST Age Age2 Age3

### DAY

#### 

#### Description

The DAY function extracts the day from the date.

#### 

#### Syntax

DAY (<variable>)

The <variable> is in date format.

#### 

#### Comments

If the date is stored in a text variable, the function will not be processed, and will be null.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE CurrentDay NUMERIC

ASSIGN CurrentDay = DAY(01/15/2007)

LIST CurrentDay

### DAYS

#### 

#### Description

The DAYS function returns the number of days between <var2> and <var1>. If any of the variables or values included in the formula is not a date, the result will be null.

#### 

#### Syntax

DAYS(<var1>, <var2>)

The <variable> is in a date format.

#### 

#### Comments

If the date stored in <var1> is later (more recent) than the date in <var2>, the result is the difference in days expressed as a negative number.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE SickDays NUMERIC

ASSIGN SickDays = DAYS(04/18/1940, DateOnset)

LIST SickDays GRIDTABLE

### EXISTS

#### Description

This function returns True if a file exists. Otherwise, it returns False.

#### 

#### Syntax

EXISTS(<variable>)

<variable> represents the complete path and file name in text format.

#### 

#### Comments

If you do not have permission to access the file, a False may be returned.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE var1 TEXTINPUT

ASSIGN var1="C:\epi\_info\epimap.exe"

IF EXISTS(Var1) =(+) then

DIALOG "Hello"

END

IF Exists("C:\Epi\_Info\EpiInfo.mnu")=(+) then

DIALOG "File epiInfo.mnu exists"

END

### 

### EXP

#### Description

This function raises the base of the natural logarithm (e) to the power specified.

#### 

#### Syntax

EXP(<variable>)

#### 

#### Comments

This variable can be an existing numeric variable, a defined variable containing numbers, or a numeric constant.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE ExpA NUMERIC

ASSIGN ExpA=EXP(Age)

LIST ExpA Age

### FILEDATE

**Description**

This function returns the date a file was last modified or created. If FILEDATE is specified with a file path that lacks a directory, the current directory is used. If FILEDATE is specified without a file, or with a file that does not exist, the function returns missing.

#### 

#### Syntax

FILEDATE(<variable>)

The <variable> represents the complete file path and the name is text format.

#### 

#### Comments

This function is useful when several users are updating a large database.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:RHepatitis

DEFINE NewUpdate DATEFORMAT

ASSIGN NewUpdate=FILEDATE("C:\epi\_info\Sample.mdb")

IF FILEDATE("C:\epi\_info\Sample.mdb") > NewUpdate THEN

DIALOG "This information may be out of date. Please check the source." TITLETEXT="Warning"

END

LIST NewUpdate

### 

### FINDTEXT

#### 

#### Description

This function returns the position in a variable in which the string is located.

#### 

#### Syntax

FINDTEXT(<variable1>,<variable2>)

The <variable1> represents the string of characters to be found. The <variable2> represents the string to be searched.

#### 

#### Comments

If the sting is not found, the result is 0; otherwise it is a number corresponding to the position of the string starting from the left. The first character is 1. If the result is 0, the test was not found.

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE Var11 NUMERIC

VAR11=FINDTEXT("M",LASTNAME)

LIST LASTNAME Var11

### 

### FORMAT

**Description**

This function changes the format of one variable type to text in a specified format. If no format is specified it returns text and converts a number to text.

#### 

#### Syntax

FORMAT(<variable>,["Format Specification"])

The <variable> represents a variable in any format and the [Format Specification] can represent any of the following:

| Format Specification | Description |
| --- | --- |
| **Date Formats** |  |
| General Date | 11/11/1999 05:34 |
| Long Date | System's long date format |
| Medium Date | System's medium date format |
| Short Date | System's short date format |
| Long Time | System's long time format |
| Medium Time | System's medium time format |
| Short Time | System's short time format |
| **Number Formats** |  |
| General Number | No thousand separator |
| Currency | Thousand separator plus two decimal places (based on system settings) |
| Fixed | At least #.## |
| Standard | #,###.## |
| Percent | Number multiplied by 100 plus a percent sign |
| Scientific | Standard scientific notation |
| Yes/No | Displays NO if number = 0, else displays Yes |
| True/False | False if number = 0 |
| On/Off | True if number <> 0  Displays 0 if number = 0, else displays 1 |
| Custom Format | Allows for the creation of customized formats |

#### Comments

Output may vary based on the specific configuration settings of the local computer.

Format(Time, "Long Time")

MyStr = Format(Date,"Long Date")

MyStr = Format(MyTime,"h:m:s")

Returns "17:4:23"

MyStr = Format(MyTime,"hh:mm:ssAMPM")

Returns "05:04:23 PM"

MyStr = Format(MyDate,"dddd, mmm yyyy")

Returns "Wednesday, ' Jan 27 1993". If format is not supplied, a string is returned.

MyStr = Format(23)

Returns "23".

User-defined formats

MyStr = Format(5459.4, "##,##0.00")

Returns "5,459.40"

MyStr = Format(334.9, "###0.00")

Returns "334.90"

MyStr = Format(5, "0.00%")

Returns "500.00%"

MyStr = Format("HELLO", "<")

Returns "hello"

MyStr = Format("This is it", ">")

Returns "THIS IS IT"

MyStr = Format("This is it", ">;\*")

Returns "THIS IS IT"

#### Example

READ 'C:\Epi\_Info\Refugee.MDB':Patient

DEFINE var2 NUMERIC

DEFINE var3 NUMERIC

DEFINE var4 NUMERIC

DEFINE var5 NUMERIC

DEFINE var6 NUMERIC

DEFINE var7 YN

DEFINE var8 Boolean

DEFINE var9

DEFINE var10

var2=FORMAT(BOH, "Currency")

var3=FORMAT(BOH, "fixed")

var4=FORMAT(BOH, "Standard")

var5=FORMAT(BOH, "Percent")

var6=FORMAT(BOH, "Scientific")

var7=FORMAT(BOH, "Yes/No")

var8=FORMAT(BOH, "True/false")

var9=FORMAT(BOH, "On/Off")

var10=FORMAT(BOH, "VB\s #,###.##")

LIST dob var2 var3 var4 var5 var6 var7 var8 var9 var10

### HOUR

#### 

#### Description

This function returns a numeric value that corresponds to the hour recorded in a date/time or time variable.

#### 

#### Syntax

HOUR(<variable>)

The <variable> represents a variable in date format.

#### 

#### Comments

If the time is stored in a text variable, the function will not be processed, and the result will be null.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Local DATEFORMAT

ASSIGN Local = SYSTEMTIME

LIST Local

DEFINE hour1 NUMERIC

ASSIGN hour1=hour(local)

LIST Local hour1

### HOURS

#### 

#### Description

This function returns the number of hours between <var1> and <var2> in numeric format.

#### 

#### Syntax

HOURS(<var1>, <var2>)

<var1> and <var2> represent variables in time or date/time format.

#### 

#### Comments

If the time stored in <var1> is later (more recent) than the time in <var2>, the result will be the difference in hours expressed as a negative number. Both variables must contain data in date, time, or date/time format. If any of the variables or values included in the formula is not a date, the result will be null.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE hour1 NUMERIC

ASSIGN hour1=HOURS(Timesupper,Dateonset)

LIST hour1

LIST hour1 Timesupper Dateonset

### 

### LN

#### 

#### Description

The function LN returns the natural logarithm (logarithm in base e) of a numeric value or variable. If the value is zero or null, it returns a null value.

#### 

#### Syntax

LN(<variable>)

The <variable> can be an existing numeric variable, a defined variable containing numbers, or a numeric constant.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Natlogofage NUMERIC

ASSIGN Natlogofage = LN(AGE)

LIST Age Natlogofage

### 

### LOG

#### 

#### Description

This function returns the base 10 logarithm (decimal logarithm) of a numeric value or variable. If the value is 0 or null it returns a null value.

#### 

#### Syntax

LOG(<variable>)

The <variable> can be an existing numeric variable, a defined variable containing numbers, or a numeric constant.

#### 

#### Comments

The results will be numeric.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Declog NUMERIC

ASSIGN Declog = LOG(Age)

LIST Age Declog

### 

### MINUTES

#### 

#### Description

This function returns the number of minutes between <var1> and <var2> in numeric format.

#### 

#### Syntax

MINUTES(<var1>, <var2>)

<var1> and <var2> represent variables in time or date/time format.

#### 

#### Comments

If the time stored in <var1> is later (more recent) than the time in <var2>, the result will be the difference in minutes expressed as a negative number. Both variables must contain data in date, time, or date/time format. If any of the variables or values included in the formula is not a date, the result will be null.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Min1 NUMERIC

ASSIGN Min1=MINUTES(timesupper,dateonset)

LIST Min1

### MONTH

#### 

#### Description

This function extracts the month from the date.

#### 

#### Syntax

MONTH(<variable>)

The <variable> represents a variable in date format.

#### 

#### Comments

If the date is stored in a text variable, the function will not be processed, and the result will be null.

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE CurrMonth NUMERIC

ASSIGN CurrMonth = MONTH(01/01/2005)

LIST CurrMonth

### MONTHS

#### 

#### Description

This function returns the number of months between <var1> and <var2>. If any of the variables or values included in the formula is not a date, the result will be null.

#### 

#### Syntax

MONTHS(<var1>, <var2>)

<var1> and <var2> represent variables in date format.

#### 

#### Comments

If the date stored in <var1> is later (more recent) than the date in <var2>, the result will be the difference in months expressed as a negative number.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE AgeMonths NUMERIC

ASSIGN AgeMonths = MONTHS(BirthDate,01/01/2000)

LIST AgeMonths

### NUMTODATE

#### 

#### Description

This function transforms three numbers into a date format.

#### 

#### Syntax

NUMTODATE(<year>, <month>, <day>)

* <year> represents a numeric variable or a number representing the year.
* <month> represents a numeric variable or a number representing the month.
* <day> represents a numeric variable or a number representing the day.

#### 

#### Comments

If the date resulting from the conversion is not valid (e.g., December 41, 2000), the date is recalculated to the corresponding valid value (e.g., January 10, 2001). When <Year> ranges between 0 and 29, it is represented as the respective year between 2000 and 2029. Values from 30 to 99 are represented as the respective year between 1930 and 1999. The earliest date that can be recorded is Jan 01, 100.

| Day | Month | Year | Date Created |
| --- | --- | --- | --- |
| 02 | 02 | 1999 | 02/02/1999 |
| 60 | 01 | 1999 | 03/01/1999 |
| 15 | 18 | 2000 | 03/18/2001 |
| 99 | 99 | 99 | 06/07/0107 |
| 20 | 74 | 74 | 08/20/1974 |

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE day1 NUMERIC

DEFINE month1 NUMERIC

DEFINE year1 NUMERIC

ASSIGN day1= day(BirthDate)

ASSIGN month1 = month(BirthDate)

ASSIGN year1 = year(BirthDate)

define date2 DATEFORMAT

ASSIGN date2= NUMTODATE(year1,month1,day1)

LIST month1 day1 year1 date2 BirthDate GRIDTABLE

### NUMTOTIME

#### 

#### Description

This function transforms three numbers into a time or date/time format.

#### Syntax

NUMTOTIME(<hour>, <minute>, <second>)

* <hour> represents a numeric constant or variable representing hours.
* <minute> represents a numeric constant or variable representing minutes.
* <second> represents a numeric constant or variable representing seconds.

#### Comments

Time must be entered in 24-hour format. Invalid dates will be recalculated to the respective valid time. If the number of the hour exceeds 24, the resulting variable will have a date/time format and the default day 1 will be December 31, 1899.

| Hour | Minute | Second | Time Created |
| --- | --- | --- | --- |
| 00 | 00 | 00 | 12:00:00 AM |
| 00 | 00 | 90 | 12:01:30 AM |
| 15 | 84 | 126 | 04:26:06 PM |
| 25 | 00 | 00 | 12/31/1899 1:00:00 AM |
| 150 | 250 | 305 | 01/05/1900 10:15:05 AM |
| 15999 | 7500 | 8954 | 09/21/1901 07:29:14 AM |

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE Var3 DATEFORMAT

ASSIGN Var3=SYSTEMTIME

DEFINE Hour1 NUMERIC

DEFINE Minute1 NUMERIC

DEFINE Second1 NUMERIC

ASSIGN Hour1=HOUR(VAR3)

ASSIGN Minute1=MINUTE(VAR3)

ASSIGN Second1=SECOND(VAR3)

DEFINE Time2 DATEFORMAT

ASSIGN Time2=NUMTOTIME(HOUR1,MINUTE1,SECOND1)

LIST Var3 Hour1 Minute1 Second1 Time2

### 

### RECORDCOUNT

#### 

#### Description

This function returns the number of records in the current View. In Analysis, this takes into account any SELECT statement and value of the Process (Deleted) setting.

#### 

#### Syntax

RECORDCOUNT

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

IF RECORDCOUNT=0 THEN

DIALOG "No records found."

QUIT

END

### RND

#### 

#### Description

This function generates a random number between <var1> and <var2>.

#### 

#### Syntax

RND(<min>, <max>)

* The <min> represents a number or numeric variable that corresponds to the lowest value of the random number to be generated.
* The <max> represents a number or numeric variable that is one higher than the highest possible value for the random number to be generated.

#### Comments

The random number generated is from <min> up to but not including <max>. For a set of random numbers consisting of only 0 and 1, the syntax RND(0, 2) would be used to generate a random number from 0 up to but not including 2. If the value for <min> is greater than the value for <max> a syntax error results.

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Random1 NUMERIC

DEFINE Random2 NUMERIC

DEFINE Random3 NUMERIC

ASSIGN Random1=RND(1,100)

ASSIGN Random2=RND(1,100)

ASSIGN Random3=RND(1,100)

LIST Random1 Random2 Random3

**ROUND**

#### 

#### Description

This function rounds the number stored in the variable to the closest integer. Positive numbers are rounded up to the next higher integer if the fractional part is greater than or equal to 0.5. Negative numbers are rounded down to the next lower integer if the fractional part is greater than or equal to 0.5.

#### 

#### Syntax

ROUND(<variable>)

The <variable> can be an existing numeric variable, a defined variable containing numbers, or a numeric constant.

#### 

#### Comments

The results are returned in numeric format.

| Differences Between TRUNC and ROUND |  |  |
| --- | --- | --- |
| Value | TRUNC | ROUND |
| 0.123456 | 0 | 0 |
| 7.99999999 | 7 | 8 |
| 45.545 | 45 | 46 |

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

FREQ AGE

DEFINE Decade NUMERIC

ASSIGN Decade=ROUND(AGE/10)+1

LIST AGE Decade

### SECONDS

#### 

#### Description

This function returns the number of seconds between <var1> and <var2> in numeric format.

#### 

#### Syntax

SECONDS(<var1>, <var2>)

<var1> and <var2> represent variables in time or date/time format.

#### 

#### Comments

If the time stored in <var1> is later (more recent) than the time in <var2>, the result will be the difference in seconds expressed as a negative number. Both variables must contain data in date, time or date/time format. If any of the variables or values included in the formula is not a date, the result is null.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Sec1 NUMERIC

ASSIGN Sec1=SECONDS(Timesupper,DateOnset)

LIST Timesupper DateOnset Sec1

### SIN, COS, TAN

#### Description

These functions return the respective trigonometric value for the specified variable.

#### 

#### Syntax

SIN(<variable>)

The <variable> can be an existing numeric variable, a defined variable containing numbers, or a numeric constant.

#### 

#### Comments

The variable is interpreted as the angle in radians. To convert degrees to radians, multiply by pi (3.1415926535897932) divided by 180.

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE SinA NUMERIC

DEFINE SinB NUMERIC

DEFINE CosA NUMERIC

DEFINE TanA NUMERIC

ASSIGN SinA=SIN(AGE)

ASSIGN SinB=SIN(AGE)\*3.14/180

ASSIGN CosA=COS(AGE)

ASSIGN TanA=TAN(AGE)

LIST SinA CosA TanA SinB

### SUBSTRING

#### 

#### Description

This function returns a string that is a specified part of the value in the string parameter.

#### 

#### Syntax

SUBSTRING(<variable>, [First], [Length])

* The <variable> represents a variable in text format.
* The [First] represents the position of the first character to extract from the file.
* The [Length] represents the number of characters to extract.

#### 

#### Comments

This function cannot be used with non-string variables.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Text1 TEXTINPUT

ASSIGN Text1 ="James Smith"

DEFINE LName TEXTINPUT

ASSIGN LName = SUBSTRING(Text1,7,5)

LIST Text1 LName

### SYSTEMDATE

#### 

#### Description

This function returns the date stored in the computer's clock.

#### 

#### Syntax

SYSTEMDATE

#### 

#### Comments

The SYSTEMDATE cannot be changed (assigned) from Classic Analysis. To use the SYSTEMDATE for computations, a new variable must be defined.

#### Example

To calculate next week's date:

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE TodayDate DATEFORMAT

ASSIGN TodayDate =SYSTEMDATE + 7

LIST TodayDate

### 

### SYSTEMTIME

#### Description

This function returns the time stored in the computer’s clock at the time the command is executed.

#### Syntax

SYSTEMTIME

#### Comments

The SYSTEMTIME cannot be changed from Classic Analysis (assigned). To use the system time for computations, a new variable must be defined.

#### Example

To calculate a time two hours after the current time:

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE Later DATEFORMAT

ASSIGN Later =SYSTEMTIME

LIST Later

ASSIGN Later =SYSTEMTIME+(120)

LIST Later

### TRUNC

#### 

#### Description

This function removes decimals from a numeric variable, returning the integer part of the number. This follows the same logic as rounding toward zero.

#### 

#### Syntax

TRUNC(<variable>)

The <variable> can be an existing numeric variable, a defined variable containing numbers, or a numeric constant.

#### Comments

The result will be returned in numeric format.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:ADDFull

DEFINE Trc1 Numeric

ASSIGN Trc1 = TRUNC(ADDSC)

### LIST Trc1 ADDSC

### 

### TXTTODATE

#### 

#### Description

This function returns a date value that corresponds to the string.

#### 

#### Syntax

TXTTODATE(<variable>)

The <variable> represents a variable in text format.

#### 

#### Comments

The text variable can be in any format that can be recognized as a date (e.g., "Jan 1, 2000", "1/1/2000").

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE Var1 TEXTINPUT

ASSIGN Var1="05/20/2006"

DEFINE Var2 DATEFORMAT

ASSIGN Var2=TXTTODATE(Var1)

DISPLAY DBVARIABLES

LIST Var1 Var2

### TXTTONUM

#### 

#### Description

This function returns a numeric value that corresponds to the string.

#### 

#### Syntax

TXTTONUM(<variable>)

The <variable> represents a variable in text format.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Oswego

DEFINE Var1 TEXTINPUT

ASSIGN Var1="12345"

DEFINE Var2 NUMERIC

ASSIGN Var2=TXTTONUM(Var1)

LIST Var1 Var2

DISPLAY DBVARIABLES

### UPPERCASE

#### 

#### Description

This function returns a string (text) variable that has been converted to uppercase.

#### 

#### Syntax

UPPERCASE(<variable>)

The <variable> represents a variable in text format.

#### Comments

Only lowercase letters are converted to uppercase; all uppercase letters and non-letter characters remain unchanged.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE LastName2 TEXTINPUT

ASSIGN LastName2 = UPPERCASE(LASTNAME)

LIST LastName2 LASTNAME

### YEAR

#### 

#### Description

This function extracts the year from a date.

#### 

#### Syntax

YEAR(<variable>)

The <variable> represents a variable in date format.

#### 

#### Comments

The date argument is any expression that can represent a date. If the date variable contains null, null is returned.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE CurrentYear NUMERIC

ASSIGN CurrentYear =YEAR(01/01/2006)

LIST CurrentYear

### 

### YEARS

#### 

#### Description

This function returns the number of years from <var1> to <var2> in numeric format. If any of the variables or values included in the formula is not a date, the result will be null.

#### 

#### Syntax

YEARS(<var1>, <var2>)

<var1> and <var2> are represented in date format.

#### 

#### Comments

If the date stored in <var1> is later (more recent) than the date in <var2>, the result will be the difference in years expressed as a negative number.

#### 

#### Example

READ {C:\*My\_Project\_Folder*\Sample\Sample.prj}:Surveillance

DEFINE SurveyDate DATEFORMAT

ASSIGN SurveyDate=05/15/2001

DEFINE AgeYears NUMERIC

ASSIGN AgeYears =YEARS(BirthDate,SurveyDate)

MEANS AgeYears

LIST AgeYears BirthDate SurveyDate