

Section 3: Numeric Formulas

You can express numeric values in XYBASIC with numbers and variables, but very frequently you will want to use more complicated formulas. You can build formulas with operators and functions. The wide variety of specialized numeric operators and functions available in XYBASIC is detailed in this section.

Arithmetic Operators

In XYBASIC you can use the arithmetic operators + (addition), - (subtraction or negation), * (multiplication), / (division), MOD (remainder), and JOIN (concatenation, described in Section 8 below). To use an operator, just write it between two numbers, variables or formulas. For example, to add 1 to 2 you write $1 + 2$; to divide the value of I by 2 you write $I / 2$.

In Integer XYBASIC, / represents integer division, so $I / 2$ gives the integer part of the result and $I \text{ MOD } 2$ gives the remainder.

Extended XYBASIC allows two different division operators: / represents floating point division (so $3 / 2$ returns the value 1.5), and \ represents integer division (so $3 \setminus 2$ returns 1, the integer part of $3 / 2$). In either version, dividing any quantity by 0 will produce an OV (OVerflow) error.

Extended XYBASIC also allows you to use the exponentiation operator ^, which returns its first argument to the power given by its second argument. For example, $2 ^ 3$ returns 8. A FC (Function Call) error occurs if the first argument is negative and the second is not an integer.

If the result of an arithmetic operation is too small or too large, an OV (OVerflow) error will occur. This happens when a result is not in the range -32768 to 32767 in Integer XYBASIC, or not in the range $-1.7 * 10^{38}$ to $1.7 * 10^{38}$ in Extended XYBASIC.

A formula can be any legal combination of numbers, variables, operators and functions, but you must be aware of the order in which computations will be performed. In normal mathematical usage the formulas $1 + 2 * 3$ and $2 * 3 + 1$ are both considered to have the value 7 (not 9 or 8), and XYBASIC uses similar conventions to evaluate unparenthesized formulas. You can think of operators as being arranged in the following order:

- (negation)
JOIN
^ [Extended]
*, /, MOD, \ [Extended]
+, - (subtraction)

Operators which occur higher on this list are performed first; when two operators are on the same level, XYBASIC evaluates from left to right. If you want to perform operations in a specific order, you can just enclose the subformulas you want evaluated first within parentheses. The examples below are legal formulas, with the fully parenthesized version indicating the order of operator evaluation.

$3 + X * - 5$ $3 + (X * (-5))$