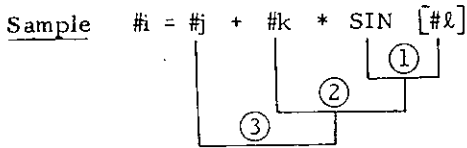## (5) Combinations of Operations

The above operations and functions may be used in combinations. A functional operation is performed first. Then, a multiply-type operation is performed. An add-type operation is performed last.

Sample #i = #j + #k * SIN [#ℓ]

(6) Change of Operational Order by [ ]

Priority may be given to an operation by enclosing it in brackets [ ]. Up to quintuple (five-hold) nesting of brackets is permitted including those of functional operations.

Sample #i = SIN [[[#j + #k] * #ℓ + #m] * #n]
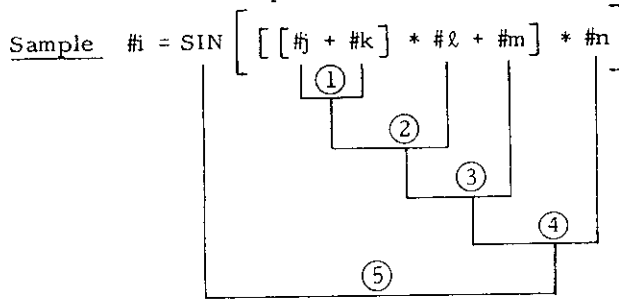
(7) Considerations for Operational Commands

A. The constant without decimal point used in ⟨expression⟩ is assumed to have a decimal point at its end.

B. When used in conditional expression IF or WHILE, function ROUND truncates the fractions.

C. When used in address data, function ROUND rounds the part below the least significant digit.

Sample (a)

#10 = 12.3758

When the least significant digit of address X is 0.001 mm, the following command

G00 X [ROUND [#10]];
means

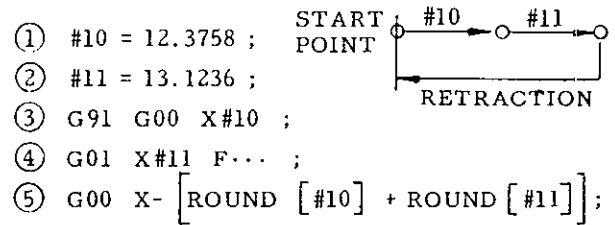G00 X12.376 ;
because 8 of 12.3758 is rounded.

This command is also equivalent to

G00 X#10 ;

Usually, ROUND is not used as mentioned above; it is used as shown below:

Sample (b)

When ROUND is used as follows, the program returns to the start point correctly:

① #10 = 12.3758 ;

② #11 = 13.1236 ;

③ G91 G00 X#10 ;

④ G01 X#11 F··· ;

⑤ G00 X- [ROUND [#10] + ROUND [#11]];

This is because the data of #10 and #11 in ③ and ④ blocks are substantially rounded before being executed.

If ⑤ block is

⑤' G00 X- [#10 + #11] ;

then, the movement is made by the following amount:

$$X- [\#10 + \#11] = X - [12.3758 + 13.1236]$$
$$= X - [25.4994]$$
$$= X - [25.499]$$

On the other hand, block movement of ③+④ is

X#10 + X#11 = X12.376 + X13.124
= X25.500

Hence, the program of ⑤' is not correct.

(8) Operational Errors

The data format and the operational errors in the user macros are as follows:

A. Data Format

The numeric data handled in user macros are of the floating point format.

| M * 2E |

where, M is sign + data 52-bit binary,
E is sign + data 10-bit binary.

B. Operational Errors

Each time an operation is performed, the following error is caused and is accumulated. The number of significant digits is 15 to 16, which compensates the error sufficiently.