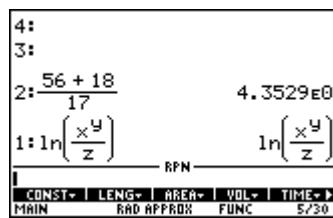


[9.19] Use a more efficient RPN interface

The algebraic interface used on the TI-89/92+ is only one possible interface. One alternative is called RPN, which is an acronym for Reverse Polish Notation. RPN is popular with some users (including me) because it is more keystroke efficient than algebraic entry, and no parentheses are used. RPN is the method historically used on Hewlett-Packard calculators such as the HP-48 and many others. Lars Frederiksen has written a thorough RPN interface for the TI-89/92+ calculators.

RPN may seem foreign if you have never used it, but most people can use it effectively within about thirty minutes or so. In addition, most RPN users soon prefer it over algebraic entry. A typical RPN screen looks like this:



While this looks like the history display of the usual algebraic entry method, it actually shows the RPN stack. A stack is a data structure in which elements are pushed on from the bottom, and functions operate on expressions on the stack. The [ENTER] key pushes expressions on the stack. For example, the keystrokes to add 2 to 4 are [2] [ENTER] [4] [+], and this illustrates the origin of the acronym RPN. Polish notation is named in honor of the Polish mathematician Jan Lukasiewicz (1878 - 1956), who developed a syntax for representing any expression without parenthesis. In Lukasiewicz' 'Polish notation', the expression to add 2 and 4 is + 2 4. The 'reverse' in RPN comes from the fact that the operator comes after the operands, instead of before.

In the simple $2 + 4$ example, there are no keystroke savings: both methods take four keystrokes. However, consider this example:

$(a+b)/(c+d)$ [ENTER] *algebraic; 12 keystrokes*

a [ENTER] b + c [ENTER] d + / *RPN; 9 keystrokes*

While the keystroke savings are real, even more significant is the fact that intermediate results are displayed immediately, which leads to earlier troubleshooting of incorrect entries. In addition, there is no mental effort expended on matching parentheses, and there are no calculation errors from mismatched parentheses. RPN is as useful with symbolic expressions as it is with numeric ones.

RPN calculators also have various stack manipulation functions, such as swap, drop, dup and rotate, which make calculations even more efficient.

There can be no argument that learning RPN takes some effort. But that effort will be repaid in orders of magnitude by faster, more accurate results.

You can get Lars' RPN at Roberto Perez-Franco's site:

<http://www.perez-franco.com/symbolator/download/rpn.html>

RPN is fully documented, with plenty of examples to get you started.