experimental mathematics with MAPLE

Help with exercises for chapter 6

Exercise 6.4. Isolate one operand in the expression `E`, and call it x. Then isolate the corresponding operand in the expression `map(f,E)`, and call it $f(x)$. The goal is to discover one function f, that maps the former into the latter. In other words, we must determine a function whose value is known only at few points of the domain. Clearly, you will need to check all values of x to arrive to a consistent answer. Perhaps less obvious is the fact that very many distinct functions would do the job, even though the problem is designed in such a way as to suggest a very obvious solution.

(a) Here we are looking for a function such that

$$0 \mapsto 100 \qquad 1 \mapsto 101 \qquad 2 \mapsto 102 \qquad 3 \mapsto 103$$

This is achieved by the function that adds 100 to its argument, which is `f:=x->100+x`. But you could as well choose `f:=x->irem(x^5,5)+iquo(x+10^3,10)`. These functions will have different values outside the specified domain. Try!

(h) No, it is not a misprint.

Exercise 6.5. The trick is to analyze the operations of the function `PrimeDiv` in slow motion. First of all, you must find out what the range specification `x=ifactor(n)`, means in various cases, that is, what are the top level operands of `=ifactor(n)`. For this purpose, try `small` values of n. Then, for a given operand `x`, you must find out what `op(1,x)` is, and what happens when you apply `expand` to it.

Exercise 6.6.

(b) This is an application of the function `select`.

(c) How do you extract the set of *distinct* elements in a list? Look at page 39, 5 lines from the bottom.