SPARC expressions

Identifier	x	:=	[$A-Za-z][$_A-Za-z0-9]*	
Variables	x	:=	id	
Type Constructors	$tycon$	:=	id	
Data Constructors	$dcon$	:=	$\_id$	
Patterns	p	:=	x	variables
		|	$()$	unit
		|	(p)	parenthesis
		|	$dcon$	data patterns
		|	$dcon\ (p?)$	
		|	$p1,\ p2$	pairs
Types	τ	:=	$\mathbb{Z}$	integers
		|	$\mathbb{N}$	natural numbers
		|	$\mathbb{B}$	booleans
		|	(τ)	parenthesis
		|	$\tau[*\tau]^+$	products
		|	$\tau \to \tau$	functions
		|	$tycon$	type constructors
Data Types	dty	:=	$dcon\ [\texttt{of}\ \tau]$	
		|	$dcon\ [\texttt{of}\ \tau] \mid dty$	
Values	v	:=	$0 \mid 1 \mid ...$	integers
		|	$-1 \mid\ -2 \mid ...$	integers
		|	$\texttt{true} \mid \texttt{false}$	booleans
		|	x	variables
		|	$()$	unit
		|	(v)	parenthesis
		|	$dcon$	data patterns
		|	$dcon\ (v?)$	
		|	$v1,\ v2$	pairs
		|	$\texttt{lambda}\ p\ \texttt{.}\ e$	lambda functions
Bindings	b	:=	$\texttt{fun}\ x(p)\ =\ e$	bind functions
		|	$p\ =\ e$	bind patterns
		|	$\texttt{type}\ tycon\ =\ \tau$	bind types
		|	$\texttt{type}\ tycon\ =\ dty$	bind datatypes
Expressions	e	:=	v	values
		|	(e)	parenthesis
		|	$\texttt{not}\ e$	negations
		|	$e1$ binop $e2$	infix operators
		|	$v1,\ v2$	sequential pairs
		|	$v1 \mid\mid v2$	parallel pairs
		|	$\texttt{case}\ e1\ [\ \mid p \Rightarrow e2\ ]^+$	case
		|	$\texttt{if}\ e1\ \texttt{then}\ e2\ \texttt{else}\ e3$	conditionals
		|	$\texttt{[}\ e1\ e2\ \texttt{]}$	function applications
		|	b	global bindings
		|	$\texttt{let}\ b^+\ \texttt{in}\ e\ \texttt{end}$	local bindings
		|	$seqop$	sequence operations

Sequence operations

Operations	*seqop*	:=	$\|e_s\|$	length
		|	$<<>>$	empty
		|	$<< e >>$	singleton
		|	$<< e_x : 0 \leq x < e_n >>$	tabulate
		|	$<< e : p \setminus \texttt{in}\ e_s >>$	map
		|	$<< p \setminus \texttt{in}\ e_s \mid e >>$	filter
		|	$e_s[i]$	nth
		|	$e_s[i : j]$	subseq
		|	$e_1 + + e_2$	append

SPARC operators

Operators	*op*	:=	`+` | `-` | `*` | `/`	arithmetic operators
		|	`>` | `<` | `==`	relational operators
		|	`and` | `or`	logical operators
		|	`not`	unary operators
		|	, | ||	sequential or parallel chains
		|	++	seq append

Precedences (in decreasing order)

1) unary operators
2) $* \mid /$
3) $+ \mid -$
4) logical operators
5) chain operators
6) ++