

21.22HRS. 14 SEPT 1973.

** RSB **

[FILE DUMP]

[LIST EDITING FUNCTION]

[THEOREMS]

[/ DEFS]

[MONTHMS]

[ASK AGAIN]

[TREESORT]

[QUANTIFY]

[QUANT DEFS]

[NEW DEFS]

[AUX THMS]

[. FILEFT]

[. DLP80]

36

[LIST EDITING FUNCTION] TRACK 36
SEPT 1973]
CREATED 21.04 14 9 1973

[21.22 14

COMMENT 'THE FOLLOWING FUNCTIONS ARE INTENDED TO ASSIST
THE EDITING OF LISTS. THE FUNCTIONS MAKE EXTENSIVE USE
OF THE 77 EDITOR.

EDIPR WILL INSERT INTO THE EDIT BUFFER ITS ARGUMENT USING DEBPR.

EDVW WILL PRINT A WINDOW AROUND THE CURRENT POSITION THAT IS
2*EDVWSIZE WIDE. EDVWSIZE IS INITIALIZED TO 10.

EDLED IS THE WAY TO BEGIN A LIST EDIT. IT INSERTS ITS ARGUMENT
INTO THE BUFFER (AFTER A DAZ) AND SAVE ITS ARGUMENT IN
EDNAME.

EDLFIN IS THE WAY TO END A LIST EDIT. IT COMPIES THE BUFFER
AND CRAMS THE TOP OF THE STACK INTO EDNAME, THUS IDENTIFYING
THE FINAL BUFFER WITH THE ORIGINAL LIST BEING EDITED.

`;

VARS EDVWSIZE;
10->EDVWSIZE;

VARS OPERATION 2 (EDDAZ EDUNDO EDIC EDVC EDC);
VARS OPERATION 1 (EDNAME EDH);

OPERATION 2 EDIPR EDXX1;
VARS CUCHAROUT;
EDIC(0);
EDUNDO();
NONOP EDIC ->CUCHAROUT;
DEBPR(EDXX1);
END;

OPERATION 2 EDLED EDXX1;
EDDAZ();
EDIPR(EDXX1);
EDA();
EDXX1->EDNAME;
END;

OPERATION 2 EDVW;
VARS EDXX1;
EDH()->EDXX1;
EDVC(EDXX1-EDVWSIZE,EDXX1+EDVWSIZE);
END;

OPERATION 2 EDLFIN;
VARS EDXX1;
EDC(0,EDZZ)->EDXX1;
HD(EDXX1)->HD(EDNAME);
TL(EDXX1)->TL(EDNAME);
END;

COMMENT 'THEOREMS INVOLVING APPEND, LENGTH AND REVERSE';

[T 1 1]::
[EQUAL [APPEND A [APPEND B C]] [APPEND [APPEND A B] C]];

[T 1 2]::
[IMPLIES [EQUAL [APPEND A B] [APPEND A C]] [EQUAL B C]];

[T 1 3]::
[EQUAL [LENGTH [APPEND A B]] [LENGTH [APPEND B A]]];

[T 1 4]::
[EQUAL [REVERSE [APPEND A B]] [APPEND [REVERSE B] [REVERSE A]]];

[T 1 5]::
[EQUAL [LENGTH [REVERSE D]] [LENGTH D]];



[T 1 6]::
[EQUAL [REVERSE [REVERSE A]] A];

[T 1 7]::
[IMPLIES A [EQUAL [LAST [REVERSE A]] [CAR A]]];

[T 1 8 * UNPROVEN]::
[IMPLIES [EVEN2 N][EQUAL A [REVN N A]]];

COMMENT 'THEOREMS INVOLVING MEMBER';

[T 2 1]::
[IMPLIES [MEMBER A B] [MEMBER A [APPEND B C]]];

[T 2 2]::
[IMPLIES [MEMBER A B] [MEMBER A [APPEND C B]]];

[T 2 3]::
[IMPLIES [AND [NOT [EQUAL A [CAR B]]] [MEMBER A B]] [MEMBER A [CDR B]]];

[T 2 4]::
[IMPLIES [OR [MEMBER A B] [MEMBER A C]] [MEMBER A [APPEND B C]]];

[T 2 5]::
[IMPLIES [AND [MEMBER A B] [MEMBER A C]] [MEMBER A [INTERSEC B C]]];

[T 2 6]::
[IMPLIES [OR [MEMBER A B] [MEMBER A C]] [MEMBER A [UNION B C]]];

[T 2 7]::
[IMPLIES [SUBSET A B] [EQUAL [UNION A B] B]];

[T 2 8]::
[IMPLIES [SUBSET A B] [EQUAL [INTERSECT A B] A]];

[T 2 9]::
[EQUAL [MEMBER A B] [NOT [EQUAL [ASSOC A [PAIRLIST B C]] NIL]]];

COMMENT 'THEOREMS INVOLVING MAPLIST';

[T 3 1]::
[EQUAL [MAPLIST [APPEND A B] C] [APPEND [MAPLIST A C] [MAPLIST B C]]];

[T 3 2]::
[EQUAL [LENGTH [MAPLIST A B]] [LENGTH A]];

[T 3 3]::
[EQUAL [REVERSE [MAPLIST A B]] [MAPLIST [REVERSE A] B]];

COMMENT 'THEOREMS INVOLVING MISC LISP FUNCTIONS';

[T 4 1]::
[EQUAL [LIT [APPEND A B] C D] [LIT A [LIT B C D] D]];

[T 4 2]::
[IMPLIES [AND [BOOLEAN A] [BOOLEAN B]]
[EQUAL [AND [IMPLIES A B] [IMPLIES B A]] [EQUAL A B]]];

[T 4 3]::
[EQUAL [ELEMENT B A] [ELEMENT [APPEND C B] [APPEND C A]]];

[T 4 4]::
[IMPLIES [ELEMENT B A] [MEMBER [ELEMENT B A] A]];

[T 4 5]::
[EQUAL [CDRN C [APPEND A B]] [APPEND [CDRN C A] [CDRN [CDRN A C] B]]];

[T 4 6]::
[EQUAL [CDRN [APPEND B C] A] [CDRN C [CDRN B A]]];

[T 4 7]::
[EQUAL [EQUAL A B] [EQUAL B A]];

[T 4 8]::
[IMPLIES [AND [EQUAL A B] [EQUAL B C]] [EQUAL A C]];

[T 4 9]::
[IMPLIES [AND [BOOLEAN A] [AND [BOOLEAN B] [BOOLEAN C]]
[EQUAL [EQUAL A [EQUAL B C]] [EQUAL [EQUAL A B] C]]];

COMMENT 'THEOREMS INVOLVING ARITHMETIC';

[T 5 1]::
[EQUAL [PLUS N M] [PLUS M N]];

[T 5 2]::
[EQUAL [PLUS N [PLUS M K]] [PLUS [PLUS N M] K]];

[T 5 2.5]::
[EQUAL [PLUS [PLUS K L] N] [PLUS [PLUS L N] K]];

[T 5 3]::
[EQUAL [TIMES N M] [TIMES M N]];

[T 5 4]::
[EQUAL [TIMES N [PLUS M K]] [PLUS [TIMES N M] [TIMES N K]]];

[T 5 5]::
[EQUAL [TIMES N [TIMES M K]] [TIMES [TIMES N M] K]];

[T 5 6]::
[EVEN1 [DOUBLE N]];

[T 5 7]::
[EQUAL [HALF [DOUBLE N]] N];

[T 5 8]::
[IMPLIES [EVEN1 N] [EQUAL [DOUBLE [HALF N]] N]];

[T 5 9]::
[EQUAL [DOUBLE N] [TIMES 2 N]];

[T 5 10]::
[EQUAL [DOUBLE N] [TIMES N 2]];

[T 5 11]::
[EQUAL [EVEN1 N] [EVEN2 N]];

COMMENT 'THEOREMS INVOLVING ORDERING RELATIONS';

[T 6 1]::
[GT [LENGTH [CONS A B]] [LENGTH B]];

[T 6 2]::
[IMPLIES [AND [GT A B] [GT B C]] [GT A C]];

[T 6 3]::
[IMPLIES [GT A B] [NOT [GT B A]]];

[T 6 4]::
[LTE A [APPEND B A]];

[T 6 5]::
[OR [LTE A B] [LTE B A]];

[T 6 6]::
[OR [GT A B] [OR [GT B A] [EQUAL [LENGTH A] [LENGTH B]]]];

[T 6 7]::
[EQUAL [MONOT2P A] [MONOT1 A]];

[T 6 8]::
[ORDERED [SORT A]];

[T 6 9]::
[IMPLIES [AND [MONOT1 A] [MEMBER B A]] [EQUAL [CAR A] B]];

[T 6 10]::
[LTE [CDRN A B] B]];

[T 6 11 *]::
[EQUAL [MEMBER A [SORT B]] [MEMBER A B]];

[T 6 12]::
[EQUAL [LENGTH A] [LENGTH [SORT A]]];

[T 6 13 *]::
[EQUAL [COUNT A B] [COUNT A [SORT B]]];

[T 6 14]::
[IMPLIES [ORDERED A] [EQUAL A [SORT A]]];

[T 6 15]::
[IMPLIES [ORDERED [APPEND A B]] [ORDERED A]];

[T 6 16]::
[IMPLIES [ORDERED [APPEND A B]] [ORDERED B]];

[T 6 17 *]::
[EQUAL [EQUAL [SORT A] A] [ORDERED A]];

[T 6 18]::
[LTE [HALF A] A]];

[T 6 19]::
[IMPLIES [AND [ORDERED A] [AND [ORDERED B] [LTE [LAST A] [CAR B]]]]
[ORDERED [APPEND A B]]];

COMMENT 'THEOREMS INVOLVING TREE STRUCTURED LISTS';

[T 7 1]::
[EQUAL [COPY A] A]];

[T 7 2]::
[EQUAL [EQUALP A B] [EQUAL A B]];

[T 7 3]::
[EQUAL [SUBST A A B] B]];

[T 7 4]::
[IMPLIES [MEMBER A B] [OCCUR A B]];

[T 7 5]::
[IMPLIES [NOT [OCCUR A B]] [EQUAL [SUBST C A B] B]];

[T 7 6]::
[EQUAL [EQUALP A B] [EQUALP B A]];

[T 7 7]::
[IMPLIES [AND [EQUALP A B] [EQUALP B C]] [EQUALP A C]];

[T 7 8]::
[EQUAL [SWAPTREE [SWAPTREE A]] A];

[T 7 9]::
[EQUAL [FLATTEN [SWAPTREE A]] [REVERSE [FLATTEN A]]];

[T 7 10]::
[EQUAL [LENGTH [FLATTEN A]] [TIPCOUNT A]];

COMMENT 'THEOREMS ABOUT BINARY ARITHMETIC';

[T 8 1 *]::
[EQUAL [BINARYOF [PLUS N M]][BINADD [BINARYOF N] [BINARYOF M]]];

[T 8 2]::
[EQUAL [LINEAR [BINARYOF N]] N];

[T 8 3]::
[EQUAL [LINEAR [CDR [BINARYOF N]]] [HALF N]];

BINARYOF(X) = BINARYOF(Y) ↔ X=Y

[/ DEFS] TRACK 36
CREATED 10.59 1 8 1973

[21.23 14 SEPT 1973]

CAAR
ZEROP
CADR
CDDR
CDAR

~~DEFINE
([ADD1 [LAMBDA [X] [CONS NIL X]]]);~~

DEFINE
([ADDTOLIS
 [LAMBDA
 [X Y]
 [COND Y
 [COND [LTE X [CAR Y]] [CONS X Y] [CONS [CAR Y] [ADDTOLIS X [CDR Y]]]
 [CONS X NIL]]]);

DEFINE
([AND [LAMBDA [X Y] [COND X [COND Y T NIL] NIL]]]);

IF EX
IF X Y [NIC]

DEFINE
([APPEND [LAMBDA [X Y] [COND X [CONS [CAR X] [APPEND [CDR X] Y]] Y]]]);

DEFINE
([ASSOC
 [LAMBDA [X Y]
 [COND Y
 [COND [CAR Y] ←
 [COND [EQUAL X [CAR [CAR Y]]] [CAR Y] [ASSOC X [CDR Y]]]
 [ASSOC X [CDR Y]]
 NIL]]]);

DEFINE
([BINADD
 [LAMBDA
 [X Y]
 [COND
 X
 [COND Y
 [COND [CAR X] :
 [COND [CAR Y]
 [CONS 0 [BINADD [CONS 1 NIL] [BINADD [CDR X] [CDR Y]]]
 [CONS 1 [BINADD [CDR X] [CDR Y]]]
 [CONS [CAR Y] [BINADD [CDR X] [CDR Y]]]
 X].
 Y]]]);

"(1)
(QUOTE (1))

DEFINE
([BINARYOF
 [LAMBDA [X] [COND X [BINADD [CONS 1 NIL] [BINARYOF [CDR X]]] NIL]]]);

DEFINE
([BOOLEAN [LAMBDA [X] [COND X [EQUAL X T] T]]]);

DEFINE
([CDRN [LAMBDA [X Y] [COND Y [COND X [CDRN [SUB1 X] [CDR Y]] Y] NIL]]]);

DEFINE
([CONSNODE [LAMBDA [X Y] [CONS NIL [CONS X Y]]]);


```
DEFINE
([CONSTTRU [LAMBDA [X] T]]);
```

```
DEFINE
([COPY [LAMBDA [X] [COND X [CONS [COPY [CAR X]] [COPY [CDR X]]] NIL]]]);
```

```
DEFINE
([COUNT
 [LAMBDA
  [X Y]
  [COND Y
   [COND [EQUAL X [CAR Y]] [ADD1 [COUNT X [CDR Y]]] [COUNT X [CDR Y]]
   0]]]);
```

```
DEFINE
([DOUBLE [LAMBDA [X] [COND X [ADD1 [ADD1 [DOUBLE [SUB1 X]]] 0]]]);
```

```
DEFINE
([ELEMENT
 [LAMBDA [X Y] [COND Y [COND X [ELEMENT [SUB1 X] [CDR Y]] [CAR Y]] NIL]]]);
```

```
DEFINE
([EQUALP
 [LAMBDA
  [X Y]
  [COND
   X
   [COND Y [COND [EQUALP [CAR X] [CAR Y]] [EQUALP [CDR X] [CDR Y]] NIL] NIL]
   [COND Y [NIL T]]]]];
```

```
DEFINE
([EVEN1 [LAMBDA [X] [COND X [NOT [EVEN1 [SUB1 X]]] T]]];
```

```
DEFINE
([EVEN2 [LAMBDA [X] [COND X [COND [SUB1 X] [EVEN2 [SUB1 [SUB1 X]]] NIL] T]]];
```

```
DEFINE
([EXP [LAMBDA [X Y] [COND Y [TIMES X [EXP X [SUB1 Y]]] 1]]];
```

```
DEFINE
([FLATTEN
 [LAMBDA [X]
  [COND [NODE X]
   [APPEND [FLATTEN [CAR [CDR X]]] [FLATTEN [CDR [CDR X]]]
   [CONS X NIL]]]]];
```

```
DEFINE
([GT [LAMBDA [X Y] [COND X [COND Y [GT [SUB1 X] [SUB1 Y]] T] NIL]]];
```

```
DEFINE
([HALF
 [LAMBDA [X] [COND X [COND [SUB1 X] [ADD1 [HALF [SUB1 [SUB1 X]]] 0] 0]]];
```

```
DEFINE
([IMPLIES [LAMBDA [X Y] [COND X [COND Y T NIL] T]]];
```

```
DEFINE
([INTERSEC [LAMBDA [X Y]
 [COND X
```

```
[COND [MEMBER [CAR X] Y]
      [CONS [CAR X] [INTERSEC [CDR X] Y]]
      [INTERSEC [CDR X] Y]]
NIL]]);
```

```
DEFINE
([ISBINARY
 [LAMBDA
  [X]
  [COND
   X
   [COND [OR [EQUAL [CAR X] NIL] [EQUAL [CAR X] T]] [ISBINARY [CDR X]] NIL]
   T]]]);
```

```
DEFINE
([LAST [LAMBDA [X] [COND X [COND [CDR X] [LAST [CDR X]] [CAR X]] NIL]]]);
```

```
DEFINE
([LENGTH [LAMBDA [X] [COND X [ADD1 [LENGTH [CDR X]]] 0]]]);
```

```
DEFINE
([LINEAR [LAMBDA [X]
          [COND X
            [COND [CAR X]
                  [CONS NIL [DOUBLE [LINEAR [CDR X]]]]
                  [DOUBLE [LINEAR [CDR X]]]]
            NIL]]]);
```

```
DEFINE
([LIT [LAMBDA [X Y Z] [COND X [APPLY Z [CAR X] [LIT [CDR X] Y Z]] Y]]]);
```

```
DEFINE
([LTE [LAMBDA [X Y] [COND [LTE X Y] [NOT [EQUAL X Y]] NIL]]]);
```

```
DEFINE
([LTE [LAMBDA [X Y] [COND X [COND Y [LTE [SUB1 X] [SUB1 Y]] NIL] T]]]);
```

```
DEFINE
([MAPLIST
 [LAMBDA [X Y] [COND X [CONS [APPLY Y [CAR X]] [MAPLIST [CDR X] Y]] NIL]]]);
```

```
DEFINE
([MEMBER
 [LAMBDA [X Y] [COND Y [COND [EQUAL X [CAR Y]] T [MEMBER X [CDR Y]] NIL]]]);
```

```
DEFINE
([MONOT1
 [LAMBDA
  [X]
  [COND
   X
   [COND [CDR X] [COND [EQUAL [CAR X] [CAR [CDR X]]] [MONOT1 [CDR X]] NIL] T]
   T]]]);
```

```
DEFINE
([MONOT2
 [LAMBDA [X Y] [COND Y [COND [EQUAL X [CAR Y]] [MONOT2 X [CDR Y]] NIL] T]]]);
```

```
DEFINE
([MONOT2P [LAMBDA [X] [COND X [MONOT2 [CAR X] [CDR X]] T]]]);
```

~~DEFINE
([NODE [LAMBDA [X] [COND X [COND [CAR X] NIL [COND [CDR X] T NIL]] NIL]]]);~~

DEFINE
([NOT [LAMBDA [X] [COND X NIL T]]]);

~~DEFINE
([NUMBERP [LAMBDA [X] [COND X [COND [CAR X] NIL [NUMBERP [CDR X]]] T]]]);~~

DEFINE
([OCCUR
 [LAMBDA [X Y]
 [COND [EQUAL X Y]
 T
 [COND Y [COND [OCCUR X [CAR Y]] T [OCCUR X [CDR Y]]] NIL]]]);

DEFINE
([OR [LAMBDA [X Y] [COND X T [COND Y T NIL]]]);

DEFINE
([ORDERED
 [LAMBDA
 [X]
 [COND
 X
 [COND [CDR X] [COND [LTE [CAR X] [CAR [CDR X]]] [ORDERED [CDR X]] NIL] T
 T]]]);

DEFINE
([PAIRLIST
 [LAMBDA [X Y]
 [COND X
 [COND Y
 [CONS [CONS [CAR X] [CAR Y]] [PAIRLIST [CDR X] [CDR Y]]]
 [CONS [CONS [CAR X] NIL] [PAIRLIST [CDR X] NIL]]]
 NIL]]]);

DEFINE
([PLUS [LAMBDA [X Y] [COND X [ADD1 [PLUS [SUB1 X] Y]] Y]]]);

DEFINE
([REVERSE
 [LAMBDA [X] [COND X [APPEND [REVERSE [CDR X]] [CONS [CAR X] NIL]] NIL]]]);

DEFINE
([REVN [LAMBDA [X Y] [COND X [REVERSE [REVN [CDR X] Y]] Y]]]);

DEFINE
([SORT [LAMBDA [X] [COND X [ADDTOLIS [CAR X] [SORT [CDR X]]] NIL]]]);

~~DEFINE
([SUB1 [LAMBDA [X] [CDR X]]]);~~

DEFINE
([SUBSET
 [LAMBDA [X Y] [COND X [COND [MEMBER [CAR X] Y] [SUBSET [CDR X] Y] NIL] T]]]);

DEFINE
([SUBST

```
[LAMBDA
  [X Y Z]
  [COND [EQUAL Y Z]
        X
        [COND Z [CONS [SUBST X Y [CAR Z]] [SUBST X Y [CDR Z]]] NIL]]]);
```

```
DEFINE
([SWAPTREE
  [LAMBDA [X]
    [COND [NODE X]
          [CONS [SWAPTREE [CDR [CDR X]]] [SWAPTREE [CAR [CDR X]]]
              X]]]);
```

```
DEFINE
([TET
  [LAMBDA
    [X Y]
    [COND
      Y
      [COND [EQUAL [CAR Y] X] [CONS [CAR Y] [TET X [CDR Y]]] [TET X [CDR Y]]
            NIL]]]);
```

```
DEFINE
([TGT
  [LAMBDA
    [X Y]
    [COND
      Y
      [COND [NOT [LTE [CAR Y] X]] [CONS [CAR Y] [TGT X [CDR Y]]] [TGT X [CDR Y]]
            NIL]]]);
```

```
DEFINE
([TIMES [LAMBDA [X Y] [COND X [PLUS Y [TIMES [SUB1 X] Y]] 0]]]);
```

```
DEFINE
([TIPCOUNT
  [LAMBDA [X]
    [COND [NODE X]
          [PLUS [TIPCOUNT [CAR [CDR X]]] [TIPCOUNT [CDR [CDR X]]]
              1]]]);
```

```
DEFINE
([TLT
  [LAMBDA
    [X Y]
    [COND Y
          [COND [LT [CAR Y] X] [CONS [CAR Y] [TLT X [CDR Y]]] [TLT X [CDR Y]]
                NIL]]]);
```

```
DEFINE
([TRIPAPP [LAMBDA [X Y Z]
  [COND X
        [CONS [CAR X] [TRIPAPP [CDR X] Y Z]]
        [COND Y [CONS [CAR Y] [TRIPAPP X [CDR Y] Z]] Z]]]);
```

```
DEFINE
([UNION [LAMBDA [X Y]
  [COND X
        [COND [MEMBER [CAR X] Y]
              [UNION [CDR X] Y]
```

```
[CONS [CAR X] [UNION [CDR X] Y]]  
Y]]]);
```

~~DEFINE~~

~~(EXOR [LAMBDA [X Y] [COND X [COND Y NIL T] [COND Y T NIL]]]);~~

[NMONTHMS] TRACK 36
CREATED NIL

[21.24 14 SEPT 1973]

[T N 1]::
[EQUAL [APPEND A B] [APPEND B A]];

[T N 2]::
[EQUAL [REVERSE [APPEND A B]] [APPEND [REVERSE A] [REVERSE B]]];

[T N 3]::
[EQUAL [LENGTH [REVERSE A]] A];

[T N 4]::
[EQUAL [REVERSE A] A];

[T N 5]::
[IMPLIES [MEMBER A B] [MEMBER A [INTERSECT B C]]];

[T N 6]::
[IMPLIES [MEMBER A B] [MEMBER A [INTERSECT C B]]];

[T N 7]::
[EQUAL [REVERSE [MAPLIST A B]] [MAPLIST A B]];

[T N 8]::
[IMPLIES [NUMBERP A] [EVEN A]];

[T N 9]::
[EQUAL [ADD A B] [MULT A B]];

[T N 10]::
[EQUAL [MULT [CONS NIL A] B] [MULT A [CONS NIL B]]];

[T N 11]::
[GT A A];

[T N 12]::
[IMPLIES [ORDERED A] [ORDERED [REVERSE A]]];

[T N 13]::
[IMPLIES [GT 2 [LENGTH A]] [BOOLEAN A]];

[T N 14]::
[GT 3 [LENGTH A]];

[T N 15]::
[IMPLIES [AND A [ORDERED A]] [EQUAL [MAX A] [LAST A]]];

[ASK AGAIN] TRACK 36
CREATED 10.55 5 7 1973

[21.24 14 SEPT 1973]

VARS INLIST;

[[FILER][FILES][TIDYFILE][DMOVE][AUDIT BASIC WORDS]
[DAPPEND][DPTBIN][DSET][PRDUMP][TRACE][PRDISC]]->INLIST;
FUNCTION
BAR;

APPLIST(INLIST,LAMBDA FN;VARS X;LAPSETIME->X;
LIBRARY(FN)->FN;
PR(LAPSETIME-X,/16);POPGOBBLE(FN);END);

END;

[TREESORT] TRACK 36
CREATED 15.27 1 6 1973

[21.24 14 SEPT 1973]

```
DEFINE([CNSNODE [LAMBDA [TREE1 IND TREE2]
[CONS TREE1 [CONS IND TREE2]]]]);
```

```
DEFINE([LHTREE [LAMBDA [NODE] [CAR NODE]]]);
DEFINE([INDEX [LAMBDA [NODE] [CAR [CDR NODE]]]]);
DEFINE([RHTREE [LAMBDA [NODE] [CDR [CDR NODE]]]]);
```

```
DEFINE([CNSTIP [LAMBDA [ELE] [CONS ELE NIL]]]);
DEFINE([TIP [LAMBDA [X] [EQUAL [CDR X] NIL]]]);
DEFINE([TIPELE [LAMBDA [TIP] [CAR TIP]]]);
```

```
DEFINE([TOTREE [LAMBDA [ELE TREE]
[COND [NILTREE TREE]
[CNSTIP ELE]
[COND [TIP TREE]
[COND [LTE [TIPELE TREE] ELE]
[CNSNODE TREE ELE [CNSTIP ELE]]
[CNSNODE [CNSTIP ELE] [TIPELE TREE] TREE]]
[COND [LTE [INDEX TREE] ELE]
[CNSNODE [LHTREE TREE] [INDEX TREE] [TOTREE ELE [RHTREE TREE]]]
[CNSNODE [TOTREE ELE [LHTREE TREE] [INDEX TREE] [RHTREE TREE]]]]]]]);
```

```
DEFINE([NILTREE [LAMBDA [X] [EQUAL X NIL]]]);
```

```
DEFINE([FLATTEN [LAMBDA [TREE]
[COND [NILTREE TREE]
NIL
[COND [TIP TREE] [CONS [TIPELE TREE] NIL]
[APPEND [FLATTEN [LHTREE TREE]] [FLATTEN [RHTREE TREE]]]]]]]);
```

```
DEFINE([MAKETREE [LAMBDA [LIST]
[COND LIST
[TOTREE [CAR LIST] [MAKETREE [CDR LIST]]]
NIL]]]);
```

```
APPLIST([FLATTEN NILTREE TIP ELE LHTREE TOTREE CNSTIP CNSNODE
INDEX RHTREE MAKETREE],NORMDEF);
```


[QUANTIFY] TRACK 36
CREATED 9.29 29 5 1973

[21.24 14 SEPT 1973]

```
FUNCTION DEQUANTIFY L;
VARS DEF MAC FORMVAR ACCVAL BODY VLIST NEWNAME;
IF ATOM(L) THEN L; EXIT;
PROP("MAC",HD(L))->DEF;
IF DEF=UNDEF THEN MAPLIST(L,DEQUANTIFY);EXIT;
HD(L)->MAC;
HD(TL(L))->FORMVAR;
HD(TL(TL(L)))->ACCVAL;
HD(TL(TL(TL(L))))->BODY;
DEQUANTIFY(BODY)->BODY;
[% FORMVAR %]->VLIST;
ALLV(BODY);
REV(VLIST)->VLIST;
GENSYM(MAC,0)->NEWNAME;
SCHEMATIZE(DEF)->DEF;

DEFINE([% NEWNAME, [% "LAMBDA", VLIST,DEF %] %]);
MAC->PROP("MACFUN",NEWNAME);
BODY->PROP("BODY",NEWNAME);
NEWNAME:::(ACCVAL:::TL(VLIST));
END;

FUNCTION ALLV L;
IF ATOM(L) THEN
  IF CONSTANT(L) OR MEMBER(L,VLIST) THEN
    ELSE CONS(L,VLIST)->VLIST;CLOSE;
ELSE APPLIST(TL(L),ALLV);
CLOSE;
END;

FUNCTION SCHEMATIZE L;
IF ATOM(L) THEN IF CONSTANT(L) THEN L; ELSE FORMVAR;CLOSE;EXIT;
IF HD(L)=MAC THEN NEWNAME:::([% "CDR", FORMVAR %]::TL(VLIST));EXIT;
IF HD(L)="SCH" THEN SUBST(SUBST(FORMVAR,"LIST",HD(TL(L))),FORMVAR,
BODY);EXIT;
HD(DEF):::MAPLIST(TL(L),SCHEMATIZE);
END;

FUNCTION CONSTANT L;
IF L=NIL OR L="T" OR ISNUMRER(L) THEN 1;ELSE 0;CLOSE;
END;

FUNCTION REQUANTIFY L;
VARS BODY VALS;
IF ATOM(L) THEN L;EXIT;
PROP("MACFUN",HD(L))->MAC;
IF MAC=UNDEF THEN MAPLIST(L,REQUANTIFY);EXIT;
PROP("BODY",HD(L))->BODY;
TL(TL(L))->VALS;
APPLIST(TL(HD(TL(PROP("DEFN",HD(L))))),
LAMBDA X1;SUBST(HD(VALS),X1,BODY)->BODY;TL(VALS)->VALS;END);
```

```
[% MAC,HD(HD(TL(PROP("DEFN",HD(L))))),  
HD(TL(L)),REQUANTIFY(BODY)%];  
END;
```

```
VARs OPPR NPPR;  
PPR->OPPR;  
FUNCTION NPPR X1;  
IF ATOM(X1) THEN X1.PR;  
ELSEIF SHD(SHD(TL(X1)))="LAMBDA" THEN X1.OPPR;  
ELSE OPPR(REQUANTIFY(X1));CLOSE;  
END;
```

[QUANT DEFS] TRACK 36
CREATED 15.10 28 5 1973

[21.24 14 SEPT 1973]

```
FUNCTION MAC X1;  
HD(TL(X1))->PROP("MAC",HD(X1));  
END;
```

```
[CALL [COND LIST [COND [SCH [CAR LIST]] [CALL] NIL] T]].MAC;  
[SOME [COND LIST [COND [SCH [CAR LIST]] T [SOME]] NIL]].MAC;  
[ENUM [COND LIST [COND [SCH [CAR LIST]] [CONS NIL[ENUM]][NUM]]NIL]].MAC;  
[MAPLIST[COND LIST [CONS [SCH [CAR LIST]][MAP]]NIL]].MAC;  
[MIN [COND LIST [CONDEMIN][MIN][COND [SCH LIST][CONS NIL LIST] NIL]]  
NIL]].MAC;  
[MAX [COND LIST [COND [SCH LIST][CONS NIL LIST][MAX]]NIL]].MAC;  
[SET [COND LIST [COND [SCH [CAR LIST]][CONS [CAR LIST][SET]][SET]]NIL]]  
.MAC;
```

[NEW DEFS] TRACK 36
CREATED NIL

[21.24 14 SEPT 1973]

```
DEFINE([CONSMAP [LAMBDA [X Y]
  [COND Y [CONS [CONS X [CAR Y]] [CONSMAP X [CDR Y]]] NIL]]]);
```

```
DEFINE([SUBSETS [LAMBDA [X]
  [COND X [APPEND [SUBSETS [CDR X]] [CONSMAP [CAR X] [SUBSETS [CDR X]]]
  [CONS NIL NIL]]]);
```

```
DEFINE([EXP [LAMBDA [X Y]
  [COND Y [MULT X [EXP X [CDR Y]]] 1]]]);
```

[AUX THMS] TRACK 36
CREATED 15.32 8 5 1973

[21.24 14 SEPT 1973]

COMMENT 'THEOREMS DEEMED NOT IMPORTANT ENOUGH TO PROVE
ALL THE TIME, OR THEOREMS WHICH EXPLOIT A TRICK
IN OUR LISP NOT IN OTHERS (LIKE NUMBERP)';

[T 0 1]::
[IMPLIES [AND [NOT [EQUAL A B]] [MEMBER A [CONS B [CONS C NIL]]]]
[MEMBER A [CONS C NIL]]];

[T 0 2]::
[IMPLIES [NUMBERP A] [EQUAL [LENGTH A] A]];

[T 0 3]::
[EQUAL [LENGTH [LENGTH A]] [LENGTH A]];

[T 0 4]::
[EQUAL [LENGTH [APPEND A B]] [APPEND [LENGTH A] [LENGTH B]]];

[T 0 5]::
[NUMBERP [LENGTH A]];

[T 0 6]::
[EQUAL [LENGTH [REVERSE A]] [REVERSE [LENGTH A]]];

[T 0 7]::
[IMPLIES [AND [NUMBERP A] [NUMBERP B]] [EQUAL [APPEND A B] [APPEND B A]]];

[T 0 8]::
[IMPLIES [EQUAL [LENGTH A] [CONS NIL B]] [EQUAL [LENGTH [CDR A]] B]];

[T 0 9]::
[IMPLIES [NUMBERP A] [EQUAL [REVERSE A] A]];

[T 0 10]::
[IMPLIES [GT A B] [NOT [EQUAL A B]]];

[T 0 11]::
[IMPLIES A [GT [APPEND A B] B]];

[T 0 12]::
[IMPLIES [AND [ORDERED A] [LTE B [CAR A]]]
[ORDERED [CONS B A]]];

[T 0 13]::
[IMPLIES [AND A [ORDERED A]] [ORDERED [CDR A]]];

[. FILEFT] TRACK 36
CREATED 12.02 2 3 1973

[21.24 14 SEPT 1973]

```
OPERATION 2 FILEFT FILE TRK1 TRK2;  
IF ISLINK(HD(FILE))  
  THEN  
DTRACK(TRK2);  
APPLIST(FILE,LAMBDA X1;  
  IF DDFIND(X1) THEN DKILL(X1); CLOSE; END);  
IF ISFUNC(EDSETPOP) THEN VALOF("EDTIDY").APPLY;  
ELSE DTIDY(); CLOSE;  
  APPLIST(FILE,LAMBDA X;FILEFT(X,TRK1,TRK2);END); EXIT;  
DREPIN(FILE,DTRACK(TRK1),DIN(FILE),DTRACK(TRK2));  
END;  
FILEFT();
```

L. DLP80] TRACK 36
CREATED 12.02 2 3 1973

[21.24 14 SEPT 1973]

```
FUNCTION DLP801;
  VARS CUCHAROUT DDG2 DDG3;
  DDF2->CUCHAROUT; 1->DDG3;
L: 2.NL;
L0: .DDF1->DDG2;
  IF DDG2=63
  THEN 64.DDF2; 67.SP; "PAGE".PR; PRINT(DDG3+1)->DDG3; GOTO L CLOSE;
  IF DDG2=TERMIN THEN EXIT;
  DDG2.DDF2;
  GOTO L0;
END;
LAMBDA X1;
VARS OLDTRACK DDF1 DDF2 CUCHAROUT X2 DDG1;
DISCUSER->OLDTRACK;
TOP:
IF ISLINK(X1)
  THEN
  IF ISLINK(HD(X1))
  THEN
  POPMESS([[LP80 15] FILE DUMP]) -> DDF2;
  DDF2 -> CUCHAROUT;
  NL(2);
  APPLIST(X1,LAMBDA;PR();NL(2);END);

  APPLIST(X1,
    LAMBDA X1;
    DDF2(64);
  DDFIND(X1)->DDG3;
  IF DDG3 THEN ELSE CHAROUT->CUCHAROUT;
  X1.PR,"Q".PR;DDF2->CUCHAROUT;EXIT; DISC(X1) -> DDF1;
    PR(X1);SP(2);PR("TRACK");SP(1);PR(DISCUSER);SP(35);
    PR(POPDATE());NL(1);"CREATED".PR,1.SP,DDG3.TL.TL.TL.DDATEPR;
    NL(2);
    DLP801();
    END);
  DDF2(TERMIN);
  ELSE
  DDFIND(X1)->DDG3;
  IF DDG3 THEN ELSE "Q".PR;EXIT;

  POPMESS("LP80":X1) -> DDF2;
  DDF2 -> CUCHAROUT;
  "TRACK".PR;DISCUSER.PR;SP(2);"CREATED".PR,1.SP;
  DDG3.TL.TL.TL.DDATEPR;
  NL(2);
  DISC(X1) -> DDF1;
  DLP801();
  DDF2(TERMIN);
  CLOSE;
  ELSE
  IF ISINTEGER(X1)
  THEN 100000 -> X2;
  ELSE INTOF(X1); INTOF((X1 - INTOF(X1)+0.01)*10) -> X2 -> X1; CLOSE;
  DTRACK(X1);
  DISCDIR -> DDG1;
```

```
([% LOOPIF DDG1 /= NIL AND X2  
THEN IF HD(HD(DDG1)) /= "FREE" THEN HD(HD(DDG1));  
X2-1->X2;CLOSE; TL(DDG1) -> DDG1; CLOSE %]) -> X1;  
GOTO TOP;  
CLOSE;  
DTRACK(OLDTRACK);  
END.APPLY;  
  
0 -> DLP801;
```