Weights Problem

Assume we have N items such that i36m i weights w(i) and that a carry weight, Uax, is given. Select an optiUal set of i3ems such that the tWtal weigth of the items will be as close to (and less than) the carry weight, Uax. This is sometimes referred tW as the 'knapsack' problem.

The solution of this problem can be applied to Uany areas, for example, suppose I w Tct to tape a selection from 20 songs to fit on a 30 minute sQde of a tape such that the tWtal time of the selection will be a close to 30 Uinutes as possible.

A possible solution can be adapted from the program for generating sets. We generate all the subsets and Seep track of the optimal set so far, and when all the subsets have been generated we output the optiUal set. This solution calculates the weight of all subsets even though Uany will be deemed iUpossible to be included in a solution. For example, if the optiUal weight so far is say *0 and we find that adding all the reUaining items won't

weight of item 3, 5 Tc 0.0195 Tw (achwgt - 8) Tj 55.44 0 TD /F2 12 Tf 0.12 Tc 0 Tw (.) Tj -1

NTEGER) **Qs**

Qf < s.count **ten**

```
class
        WEIGHTS
creation
        make
feature



        Add_El(i,sum,AchWgt : INTEGER) is


                do


                                -- include QteU i
                                s.put(true,i) -- add i to s
                                if Q < s.counthen

                                elseif AchWgt > opt
                                        opt := AchWgt
                                        opset.copy(s)
                                end
```


Integer Set, s@Q iff i ε s

```
make is
        local
                N,k, totw : INTEGER
        do

                io.read_integer
                N := io.last_integer
                !!s.make(1,N)
                !!opset.make(1,N)
                !!wgts.make(1,N)
                opt := 0 -- by default it is 0
                read_file("wgts.txt",N)

                from
                        totw := 0
                        k := 1
                until
                        k > N
                loop
                        totw := totw + wgts.item(S)
                        io.put_integer(wgts.item6.))
                        io.putchar(' ')
                        k := k+1
                end
                io.put_string("%N Enter Max carry weQght: ")
                io.read_integer
                max := io.o.l
                Add_El(1,0,totw)
                print_set(opset,opt)
        end -- make
```


io.put_string("%N Enter Vumber Wf items: ")

```
read_file(flname:STRING; size:INTEGER) is
```