



Problem D Loan Scheduling

Input File: D.IN
 Output File: standard output
 Program Source File: D.C, D.CPP, D.JAVA

The North Pole Beach Bank has to decide upon a set A_{PP} of mortgage applications. Each application $a \in A_{PP}$ has an acceptance deadline d_a , ie. the required loan must be paid at a time t_a , $0 \leq t_a \leq d_a$. If the application is accepted the Bank gets a profit p_a . Time is measured in integral units starting from the conventional time origin 0, when the Bank decides upon all the A_{PP} applications. Moreover, the Bank can pay a maximum number of L loans at any given time. The Bank policy if focussed solely on profit: it accepts a subset $s \subseteq A_{PP}$ of applications that maximizes the profit $profit(s) = \sum_{a \in s} p_a$. The problem is to compute the maximum profit the

Bank can get from the given set A_{PP} of mortgage applications.

For example, consider that $L=1$, $A_{PP}=\{a,b,c,d\}$, $(p_a,d_a)=(4,2)$, $(p_b,d_b)=(1,0)$, $(p_c,d_c)=(2,0)$, and $(p_d,d_d)=(3,1)$. The table below shows all possible sets of accepted mortgage applications and the scheduling of the loan payments. The highest profit is 9 and corresponds to the set $\{c,d,a\}$. The loan requested by the application c is paid at time 0, the loan corresponding to d is paid at time 1, and, finally, the loan of a is paid at time 2.

Time	Sets of accepted applications and loan scheduling																		
0	a			b	c	d		b	c	b	b	c	c	d	d		a	b	c
1		a					d	d	d	a		a		a		d	d	d	d
2			a								a		a		a	a		a	a
Profit	4	4	4	1	2	3	3	4	5	5	5	6	6	7	7	7	7	8	9

Write a program that reads sets of data from an input text file. Each data set corresponds to a set of mortgage applications and starts with two integers: $0 \leq N \leq 10000$ that shows the number of applications in the set, and $0 \leq L \leq 100$ which shows the maximum number of loans the Bank can pay at any given time. Follow N pairs of integers p_i d_i , $i=1,N$, that specify the profit $0 \leq p_i \leq 10000$ and the deadline $0 \leq d_i \leq 10000$ of the application i . Input data are separated by white spaces, are correct, and terminate with an end of file.

For each data set the program computes the maximum profit the Bank can get from the accepted mortgage applications corresponding to that data set. The result is printed on standard output from the beginning of a line. There must be no empty lines on output. An example of input/output is shown below.

Input										Output
4	1	4	2	1	0	2	0	3	1	9
7	2									2050
200	1	200	1	100	0	1000	2	80	1	0
50	20	500	1							
0	100									
1	0	4	1000							