|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Feed Factories** | |  |  | | --- | --- | | Prob# | cowfact | | Author | Tim Abbott | | Date | 20030309 | | From | USACO 2004 USACO Training Camp Day 4 | |

|  |
| --- |
| Problem cowfact: Feed Factories [Tim Abbott, 2003]  Farmer John has discovered that villainous feed salesmen have been  ripping him off by charging him more than the market price of M  cowbucks per pound of feed! In order to prevent this from ever being  a problem again, he plans to purchase enough feed factories to be  entirely self-sufficient and never have to purchase from a salesman.  Farmer John currently uses K pounds of feed (1 <= K <= 100) per day  on his farm.  He has surveyed a group of N (2 <= N <= 100) feed factories,  determining for each the daily productivity P\_i (1 <= P\_i <= 100)  and a daily maintenance cost C\_i (1 <= C\_i <= 100). FJ is a  business-savvy guy, and he wants to make his business as efficient  as possible. FJ measures the efficiency of a business by the formula  (total profits) / (total productivity). Since he will sell all his  feed at the market price of M (1 <= M <= 100) cowbucks/pound, the  total profit is  M \* sum(P\_i) - sum(C\_i)  Hence the efficiency is  M - (sum(C\_i) / sum(P\_i))  (we don't subtract the M\*K cost of the feed FJ uses because he would  have to pay for it anyway).  FJ only produces R (2 <= R <= 100,000) cowbucks per day in profit  from his farm, and so he will not accept expenditures greater than  that in case the cow feed industry fails.  Help him determine the maximum efficiency his new business can achieve.  PROBLEM NAME: cowfact  INPUT FORMAT:  \* Line 1: Four space-separated integers: N, K, and M, and R  \* Lines 2..N+1: Line i describes factor i with two space-separated  integers: C\_i and P\_i  SAMPLE INPUT (file cowfact.in):  5 54 7 100  10 10  20 18  30 25  40 22  50 30  OUTPUT FORMAT:  \* Line 1: The positive integer that is the truncated product of 1,000  and the maximum efficiency of FJ's business with a minimum  total productivity of K if that value is positive, or -1 if  the maximum efficiency is negative.  SAMPLE OUTPUT (file cowfact.out):  5666  OUTPUT DETAILS:  FJ takes the first 4 factories, for a total productivity of 75 and  a total cost of 100, so the efficiency is 7 - 4/3 = 5.66666... Note  that we cannot buy the first three factories and the 5th, which  would give a slightly higher efficiency, due to FJ's limited value  of R. He cannot succeed using only the first three factories because  K is too big. |

[USACO Gateway](http://ace.delos.com/upload4?init=1&a=87ssVz06adU)  |  [Comment or Question](mailto:kolstad@ace.delos.com)