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Question 3:

First ,lets differentiate all the monster by check ai <= gi or a i> gi

to list strengthincrease[] and strengthdecrease[]

It takes O(N) time

Then just start from strengthincrease[] , its all monsters that can increase strength , to make sure Beat as many monsters as possible, hero be supposed to start from smaller a to higher a,it reduce hero’s strength becomes to negative as far as possible before gaining g

So we sort strengthincrease[] from smaller a to higher a. it takes O(NlogN)(N = length of list)

After that we move to strengthdecrease[]

In this case, there are only six ways ,

1. defeat monster from smaller a to larger a

But for example we have

S = 100

M1(a:45 , g:40) and M2(100:50)

M1 first then M2 is [infeasible](C:/Users/Olson/AppData/Local/youdao/dict/Application/8.9.6.0/resultui/html/index.html" \l "/javascript:;)

100-45+40<100

but it work M2 first then M1

100-100+50>45

So not satisfy

1. defeat monster from larger a to smaller a

Also a example

S = 100

M1(a:80,g:20) M2(70:60)

M1 first then M2 is [infeasible](C:/Users/Olson/AppData/Local/youdao/dict/Application/8.9.6.0/resultui/html/index.html" \l "/javascript:;)

100-80+20 < 70

but it work M2 first then M1

100-70+60>80

So not satisfy

1. defeat monster from smaller a-g to larger a-g

S = 100

M1(a:40,g:30) M2 (a:100,g:50)

M1 first then M2 is [infeasible](C:/Users/Olson/AppData/Local/youdao/dict/Application/8.9.6.0/resultui/html/index.html" \l "/javascript:;)

100-40+30 < 100

but it work M2 first then M1

100-100+50>40

So not satisfy

1. defeat monster from larger a-g to smaller a-g

S = 100

M1(a:85,g:30) M2 (a:50,g:40)

M1 first then M2 is [infeasible](C:/Users/Olson/AppData/Local/youdao/dict/Application/8.9.6.0/resultui/html/index.html" \l "/javascript:;)

100-85+30 < 50

but it work M2 first then M1

100-50+40>85

So not satisfy

1. defeat monster from smaller g to larger g

S = 100

M1(a:75,g:10) M2 (a:40,g:20)

M1 first then M2 is [infeasible](C:/Users/Olson/AppData/Local/youdao/dict/Application/8.9.6.0/resultui/html/index.html" \l "/javascript:;)

100-75+10 < 40

but it work M2 first then M1

100-40+20>75

So not satisfy

1. defeat monster from smaller g to larger g

Because all of the others have counterexamples, so here we use small g to larger g to sort strengthdecrease[]

Totally it cost O(N)+ O(NlogN)(sort half N by smaller a and the other half by greater g)

So this algorithm is

First attact all the monsters with a <= g from smaller a to greater a

Then attact all the other monsters from greater g to smaller g

If hero can beat them all then there exist an algorithm,

Else there is no such ordering.