Question 2:

n; s[n]; f[n](sorted);v[n];

T(j): largest index i (<j) such that job i is compatible with j;

Optimal Structure:

- Case 1: select job j

  OPT[j] = v_j + OPT [T(j)];

- Case 2: does not select job j;

  OPT[j] = OPT [j-1];

Calculate T(1) to T(n);

OPT[0] = 0;

for j 1 to n;

    OPT(j) = max (v_j + OPT[T(j)], OPT[j-1])

Return OPT[n]

FindSolution(j){

    if (j=0)

        return null;

    else if (v_j + OPT[T(j)] > OPT [j-1])

        print j;

        FindSolution(T(j));

    else

        FindSolution(j-1);

Question 3:

Find the minimum minutes to get value big V, while each question is $Q_{[i]}$ (v_i, m_i)

Table:
While k is the total item [0........n] and v is the total value v [0........V], the $T_{[k, v]}$ means that the minimum required time to get total value v with k items.

Formulation: Min_time = $T_{[n, V]}$

$$T_{[k, v]} = \begin{cases} \text{Min}(\ T_{[k-1, v]},\ m_{[k]}\ ) & \text{if } v_{[k]} >= v \\ \text{Min}(\ T_{[k-1, v]},\ T_{[k-1, v-v[k]]} + m_{[k]}) & \text{otherwise} \end{cases}$$

Build $T_{[k, v]}$ Table:
  Initialize T table:
  for v = 0 to V
    $T_{[0, v]}$ =MAX_INFINITE (It will never get value v when there was 0 item)

  for k = 1 to n
    for v = 0 to V
      compute $T_{[k, v]}$ by using above formula;

Example:
Question list: i.(v, m)
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1. (2, 3)
2. (3, 2)
3. (4, 5)
4. (5, 6)

The Max value: 5
The Min_time : 5
The solution is: 2, 1

n\v	0	1	2	3	4	5
0	XX	XX	XX	XX	XX	XX
1	3	3	3	XX	XX	XX
2	2	2	2	2	5	5
3	2	2	2	2	5	5
4	2	2	2	2	5	5

Note: xx = MAX_INFINITE

Computing process:

K=1 and v = 0 to V

$T_{[1, 0]}$ = 3, since v_1 =2 >= v=0 and m_1=3 < $T_{[0, 0]}$ = XX

$T_{[1, 1]}$ = 3, since v_1 =2 >= v=1 and m_1=3 < $T_{[0, 1]}$ = XX

$T_{[1, 2]}$ = 3, since v_1 =2 >= v=2 and m_1=3 < $T_{[0, 2]}$ = XX

$T_{[1, 3]}$ = XX, since v_1 =2 < v=3 and m_1=(3 + $T_{[0, 1]}$) > $T_{[0, 3]}$ = XX

$T_{[1, 4]}$ = XX, since v_1 =2 < v=4 and m_1=(3 + $T_{[0, 2]}$) > $T_{[0, 4]}$ = XX

$T_{[1, 5]}$ = XX, since v_1 =2 < v=5 and m_1=(3 + $T_{[0, 3]}$) > $T_{[0, 5]}$ = XX

K=2 and v = 0 to V

$T_{[2, 0]}$ = 2, since v_2 =3 >= v=0 and m_2=2 < $T_{[1, 0]}$ = 3

$T_{[2, 1]}$ = 2, since v_2 =3 >= v=1 and m_2=2 < $T_{[1, 1]}$ = 3

$T_{[2, 2]}$ = 2, since v_2 =3 >= v=2 and m_2=2 < $T_{[1, 2]}$ = 3

$T_{[2, 3]}$ = 2, since v_2 =3 >= v=3 and m_2=2 < $T_{[1, 3]}$ = XX

$T_{[2, 4]}$ = 5, since v_2 =3 < v=4 and m_2=(2 + $T_{[1, 1]}$ =5) < $T_{[1, 4]}$ = XX

$T_{[2, 5]}$ = 5, since v_2 =3 < v=5 and m_2=(2 + $T_{[1, 2]}$ =5) < $T_{[1, 5]}$ = XX

K=3 and v = 0 to V

$T_{[3, 0]}$ = 2, since v_3 =4 >= v=0 and m_3=5 > $T_{[2, 0]}$ = 2

$T_{[3, 1]}$ = 2, since v_3 =4 >= v=1 and m_3=5 > $T_{[2, 1]}$ = 2

$T_{[3, 2]}$ = 2, since v_3 =4 >= v=2 and m_3=5 > $T_{[2, 2]}$ = 2

$T_{[3, 3]}$ = 2, since v_3 =4 >= v=3 and m_3=5 > $T_{[2, 3]}$ = 2

$T_{[3, 4]}$ = 5, since v_3 =4 >= v=4 and m_3=5 >= $T_{[2, 4]}$ = 5

$T_{[3, 5]}$ = 5, since v_3 =4 < v=5 and m_3=(5 + $T_{[2, 1]}$ =7) > $T_{[2, 5]}$ = 5

K=4 and v = 0 to V

$T_{[4, 0]}$ = 2, since v_4 =5 >= v=0 and m_4=6 > $T_{[3, 0]}$ = 2

$T_{[4, 1]}$ = 2, since v_4 =5 >= v=1 and m_4=6 > $T_{[3, 1]}$ = 2

$T_{[4, 2]}$ = 2, since v_4 =5 >= v=2 and m_4=6 > $T_{[3, 2]}$ = 2

$T_{[4, 3]}$ = 2, since v_4 =5 >= v=3 and m_4=6 > $T_{[3, 3]}$ = 2

$T_{[4, 4]}$ = 5, since v_4 =5 >= v=4 and m_4=6 > $T_{[3, 4]}$ = 5

$T_{[4, 5]}$ = 5, since v_4 =5 >= v=5 and m_4=6 > $T_{[3, 5]}$ = 5