



# Problem F

## Posterize

Time limit: 2 seconds



Pixels in a digital picture can be represented with three integers in the range 0 to 255 that indicate the intensity of the red, green, and blue colors. To compress an image or to create an artistic effect, many photo-editing tools include a “posterize” operation which works as follows. Each color channel is examined separately; this problem focuses only on the red channel. Rather than allow all integers from 0 to 255 for the red channel, a posterized image allows at most  $k$  integers from this range. Each pixel’s original red intensity is replaced with the nearest of the allowed integers. The photo-editing tool selects a set of  $k$  integers that minimizes the *sum of the squared errors* introduced across all pixels in the original image. If there are  $n$  pixels that have original red values  $r_1, \dots, r_n$ , and  $k$  allowed integers  $v_1, \dots, v_k$ , the sum of squared errors is defined as

$$\sum_{i=1}^n \min_{1 \leq j \leq k} (r_i - v_j)^2.$$

Your task is to compute the minimum achievable sum of squared errors, given parameter  $k$  and a description of the red intensities of an image’s pixels.

### Input

The first line of the input contains two integers  $d$  ( $1 \leq d \leq 256$ ), the number of distinct red values that occur in the original image, and  $k$  ( $1 \leq k \leq d$ ), the number of distinct red values allowed in the posterized image. The remaining  $d$  lines indicate the number of pixels of the image having various red values. Each such line contains two integers  $r$  ( $0 \leq r \leq 255$ ) and  $p$  ( $1 \leq p \leq 2^{26}$ ), where  $r$  is a red intensity value and  $p$  is the number of pixels having red intensity  $r$ . Those  $d$  lines are given in increasing order of red value.

### Output

Display the sum of the squared errors for an optimally chosen set of  $k$  allowed integer values.

**Sample Input 1**

```
2 1
50 20000
150 10000
```

**Sample Output 1**

```
66670000
```

**Sample Input 2**

```
2 2
50 20000
150 10000
```

**Sample Output 2**

```
0
```

**Sample Input 3**

```
4 2
0 30000
25 30000
50 30000
255 30000
```

**Sample Output 3**

```
37500000
```