

Problem Title Description. Problem Name: The Glittering Caves of Aglarond Author's Name: Light Switches Problem Code: LIGHTS Alphabet: G

Problem: You a  $N * M$  grid of lights, some of which are turned on. Also, there is a switch corresponding to each row which toggles the state of all the lights in that row. Return the maximum number of lights that can be turned on after exactly  $K$  switches.

Solution: Given the state of the grid, we can tell how much will the number of lights on will change if we switch the  $i$ th row. Indeed, if  $f(i)$  = number of lights on in row  $i$ , then this change will be  $M - 2f(i)$ .

Since we have just  $K$  operations to perform, it is in our best interest to increase the number of lights on by as large a number as possible at each step. There may come a time when toggling a switch may cause the number of lights on to decrease. In this case, we would like to choose the one that decreases it by the least.

Thus, in *all* cases, we choose that  $i$  having the maximum value of  $M - 2f(i)$  and make the change, after which we let  $f(i) = M - f(i)$ . Finally, after  $K$  operations, we just output  $\sum f(i)$ .