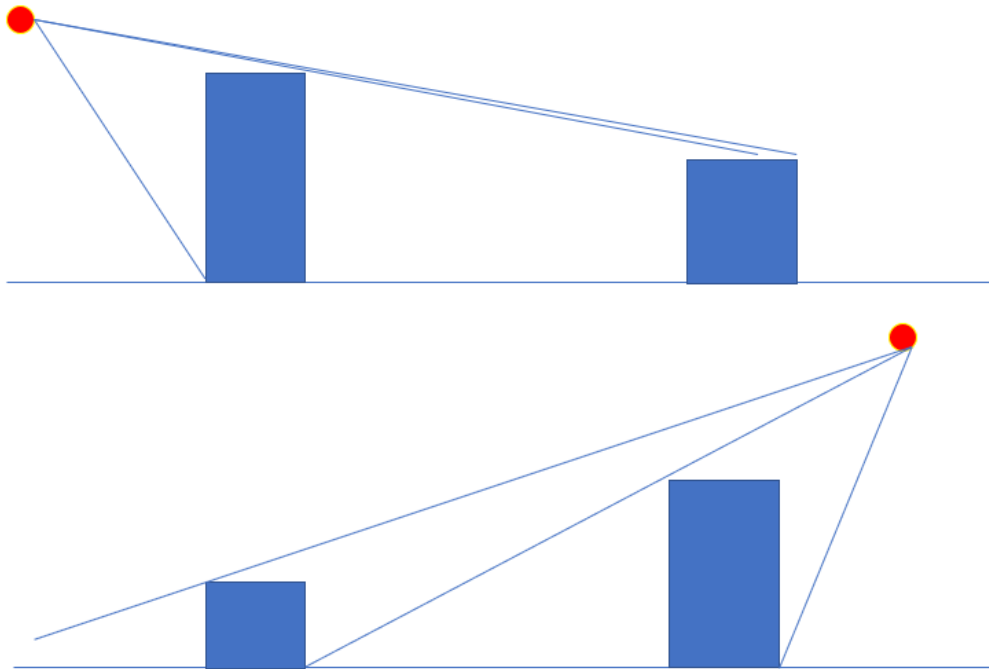


Q2-Given a coordinates of buildings and source point 'p' of sunlight. Calculate the length of building exposed to sunlight having the source at point p.

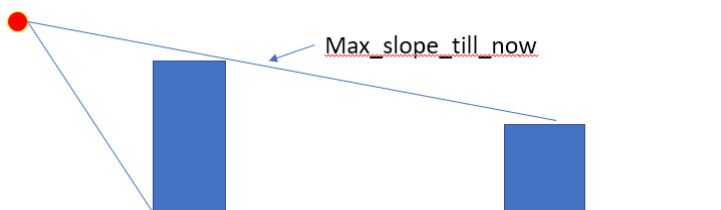
The 2 major subparts of this problem are the location of sun with respect to buildings. Below figure explains both the cases-



If the sun is at the right side, then only the right and top faces will be exposed to sunlight and if the sun is to the left, only the left and top faces will be exposed. Therefore, we need to handle these two cases separately.

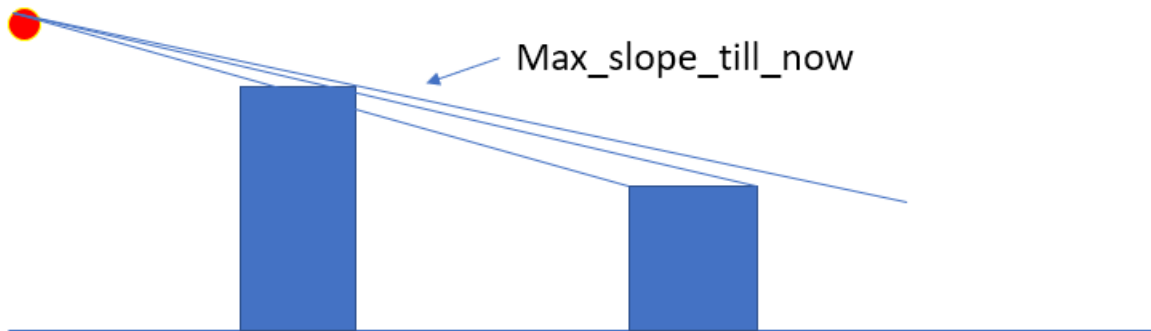
Case 1- Sun is to the left

The first building's both top and left faces will be exposed to sunlight. After the first building, we have to explicitly check for the exposed length. For this, we maintain `max_slope_till_now`. This is the maximum slope of light till now. Only the right rays with a slope greater than this will strike other buildings. We initialize max slope as the slope of the top right corner of first building.

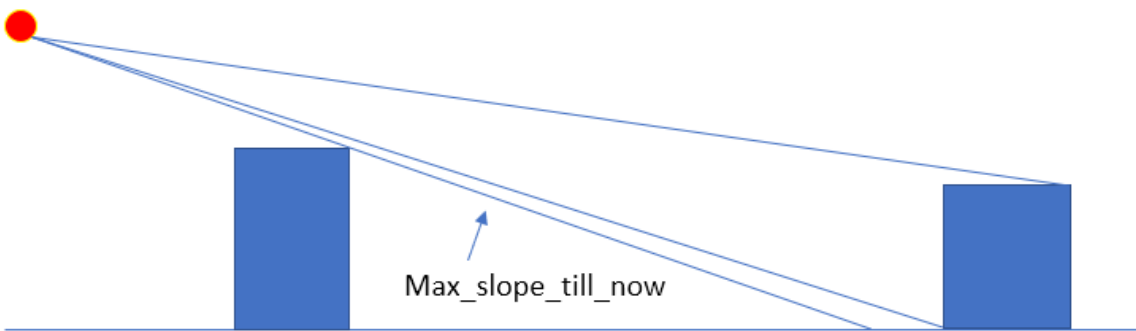


For every other building, 3 slopes are to be calculated- Slope of top right corner, bottom left corner and max_slope_till_now. The different situations arising are-

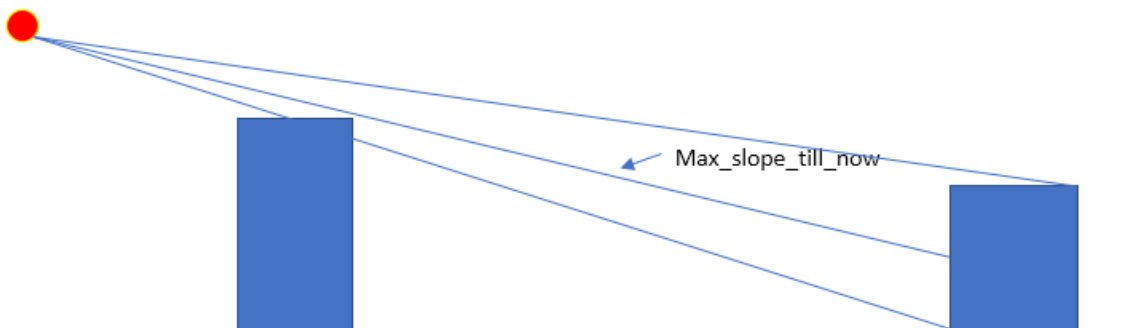
Max slope is greater than both the other slopes. In this case no part of the building will be exposed to sunlight.



Slope of top right corner is largest and max_slope_till_now is least. In this case the whole top and left face will be exposed to sunlight.



Slope of the top right corner is the highest and slope of bottom left corner is least. In this case the length from the point of intersection of max_slope_till_now to top right corner will be exposed to light.



Therefore, the algorithm is-

1. Initialize the `max_slope_till_now` for first building.
2. For every other building, calculate the other two slopes.
 - a. If `max_slope_till_now` is highest, do not update the answer.
 - b. If top right slope is highest and `max_slope_till_now` is least, add length of the left and top faces to the answer. Update `max_slope_till_now`.
 - c. If top right slope is highest and bottom left slope is least, find the point of intersection of the `max_slope_till_now` with the building. Add the corresponding length to the answer. Update `max_slope_till_now`.

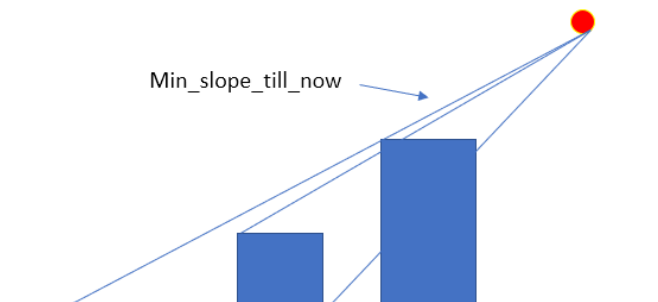
Case 2- Sun is to the right

The first building's both top and right faces will be exposed to sunlight. After the first building, we have to explicitly check for the exposed length. For this, we maintain `min_slope_till_now`. This is the minimum slope of light till now. Only the right rays with a slope less than this will strike other buildings. We initialize min slope as the slope of the top left corner of first building.

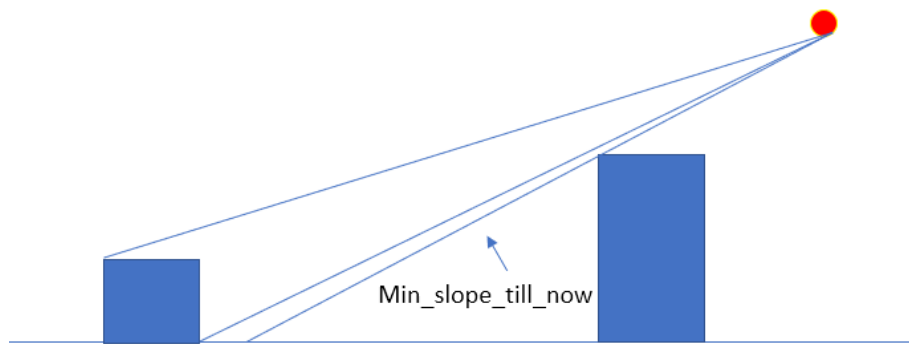


For every other building, 3 slopes are to be calculated- Slope of top left corner, bottom right corner and `min_slope_till_now`. The different situations arising are-

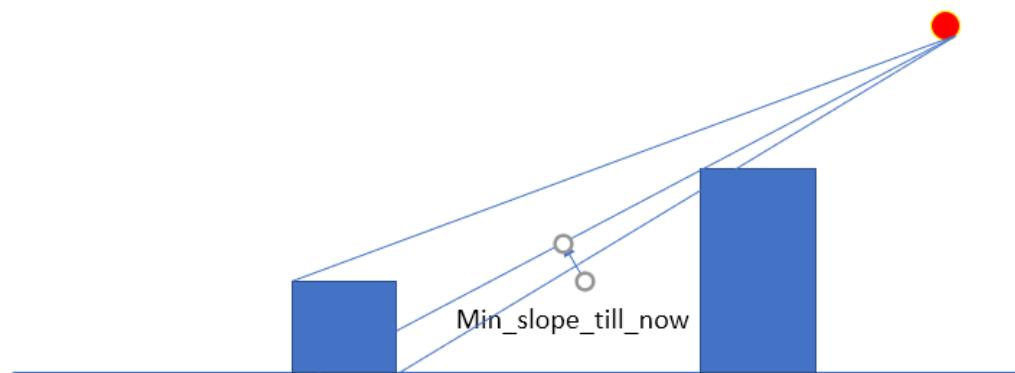
Min slope is smaller than both the other slopes. In this case no part of the building will be exposed to sunlight.



Slope of top left corner is least and $\text{max_slope_till_now}$ is largest. In this case the whole top and left face will be exposed to sunlight.



Slope of the top left corner is the least and slope of bottom right corner is largest. In this case the length from the point of intersection of $\text{min_slope_till_now}$ to top left corner will be exposed to light.



Therefore, the algorithm is-

1. Initialize the $\text{min_slope_till_now}$ for first building.
2. For every other building, calculate the other two slopes.
 - a. If $\text{min_slope_till_now}$ is least, do not update the answer.
 - b. If top left slope is least and $\text{max_slope_till_now}$ is highest, add length of the right and top faces to the answer. Update $\text{min_slope_till_now}$.
 - c. If top left slope is least and bottom right slope is highest, find the point of intersection of the $\text{min_slope_till_now}$ with the building. Add the corresponding length to the answer. Update $\text{min_slope_till_now}$.

However, there is one special case which needs to be taken care of. It can happen that the sun is directly above any building. In that case we top part of building will be exposed to the sunlight. We will then calculate length exposed to sunlight for

the left and right buildings, with initializing the `max_slope_till_now` as slope of the top right corner and `min_slope_till_now` as slope of top left corner.

