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## Assignment - 7

**Problem:** Assume you want to hike across the Shenandoah park, from the north point to the south point. You have the map of the hiking trail. You can carry two litres of water, and you can hike 'm' miles before running out of water. You will start with two full litres of water. Your official park map shows all the places at which you can refill his water and the distances between these locations. Your goal is to minimize the number of water stops along your route across the park.. Give an efficient method by which you can determine which water stops you should make. Prove that your strategy yields an optimal solution, and gives it running time.

**Solution:** Let us assume I can travel a distance of $x$ miles with two full litres and I will refill it I run out of water completely at the refilling station.

I start the trek with two full litres of water and reach the refilling station, If I have any water left I start the trek again and If I completely run out of water, then I refill the water and note the refill station.

```
def MinimumWaterStops():

    stops = total no. of stops in maps
    miles = total shenndoh distance
    current_stop = 0  # Initial starting position
    current_miles = no. of miles travelled.

    while ( current_miles < miles ):

        water_range = miles can covered with 2 lit of water

        if ( water_range < miles )

            fill water bottle.

            current_stop = fill water at stop.

        else :
                          miles
            current_stop = miles
            current_stop = max(stops)

        return current_stop
```

My intent is to move forward with 2 ltr of water, cover as much as distance as I can. Then refill my water bottles when it is completely empty. This way I can minimize or lower the no. of refilling stops.

The time complexity would be $O(\log n)$ for next stop.

For, 'm' no. of refilling stations,
it would be $O(m \log n)$.