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Q#. 02

My greedy algorithm always fills the petrol where it cannot reach at destination. So, to prove my Greedy is correct, lets take an Optimal Solution that is:

Optimal : O_1 , O_2 ,O_3 , O_4 ….
Greedy: G_1 , G_2, G_3 , G_4 ……

Where O1, O2 represents time optimal spent at each station. And G1, G2 …. Represents time spent by greedy at each station.

Let's Proof this Contradiction.
Suppose Greedy is incorrect.

Now, it is obvious that G1 = 0, as we will have full tank. So, clearly, G1 <= O1.

Now, my greedy only fills petrol at station where it must need that petrol to reach next station. Since, this is minimum requirement So, Optimal must also have spent at least at time. Now, Gx = t and Ox >= t. But this contradicts our assumption that Gx > Ox.

So, the above proof represents that Greedy always give at least optimal solution. Or it always stays ahead of Optimal.

So, Greedy is correct.