Proof the Ninth for CS250

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Consider the following situation ...

On a circular race track, a particular but arbitrary number of gas cans are positioned according to a particular but arbitrary sequence. The sum total of the gas in the cans is sufficient to get the car around the track precisely one time.

It is given to us to prove the following: For any number of cans of gas positioned around the track, and for any identity of the sequence by which they are arranged, there exists a particular starting point on the track which will enable the car to traverse the track precisely one time.

Proof. Let $n \in \mathbb{N}$ be the number of cans of gas. Let the total amount of gas in all of the cans be $1g$ where g is some arbitrary unit, to represent 1 cycle around the track. Note that the fewest number of possible cans is 1, and that the total amount of gas in all of the cans must be $1g$.

Base cases: $n = 1$*:*

Our base case is when there is only 1 can of gas by the track. Since the total amount of gas in all of the cans must be $1g$, and since there is only one can, there must be $1g$ of gas in that one can- enough to get us all the way around the track. Therefore, clearly if we place the car at that can of gas, it will be able to make one full revolution around the track.

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