CSI 35 HW 2 **Mathematical Induction**

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we are given:

1) infinitely many train stations
2) train stops at the first station
3) if a train stops at a station, then it stops at the next station.

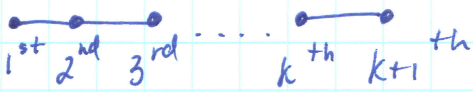
Show that the train stops at all stations. ← $\forall n\, P(n)$, $n \in \mathbb{Z}^+$

Proof:

Basis step: $n = 1$ train stops at the first station (see 2))

• hence $P(1)$ is true. This completes basis step.

Inductive step: assume that for any arbitrary fixed



$k \in \mathbb{Z}^+$ train stops at the k^{th} station (IH)

$P(k)$

From 3) if a train stops at k^{th} station ($P(k)$) → then it stops at the $k+1^{th}$ station $P(k+1)$

Therefore, $P(k+1)$ is also true. This completes ind. step.

By math. induction, the train stops at all stations.

q.e.d.