

Monochromatic Cows

Consider the following statements.

Suppose each cow is only one color.

Every group of cows contain only cows of the same color.

Spoof by strong induction:

P(1): all groups of cows of size one contain only cows of one color.

(IH): $P(k) \rightarrow P(k + 1)$ for all $k \geq 1$.

Consider a group of $k + 1 \geq 2$ cows.

By our IH, all groups of size $\geq k$ contain cows of only one color.

So, break the $k + 1$ cows into 2 overlapping subgroups;

these by our IH are all the same color,

and since they share a cow in common the 2 groups are the same color.

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