Show All Solutions

**Rosen, Discrete Mathematics and Its Applications, 7th edition**, Global Edition
**Extra Examples**
**Section 5.2—Strong Induction and Well-Ordering**

Extra Examples — *Page references correspond to locations of Extra Examples icons in the textbook.*

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**p.331, icon at Example 2**

**#1.** Consider an infinite checkerboard of squares, where all squares are white other than an initial set $B_0$ of $n$ black squares; we call $B_0$ the initial generation of black squares. We define new generations of black squares recursively. Subsequent generations of black squares $B_1, B_2, \ldots$ are defined by the rule that a square is in $B_k$ if and only if at least two of this square itself, the square directly above it, and the square directly to its right are in $B_{k-1}$. That is, a square on the checkerboard is in a new generation of black squares, if in the previous generation of black squares, there are more black squares than white squares among the square itself, the square above it, and the square to its right. Use strong induction to prove that $B_n = \emptyset$, that is, after $n$ steps (where $n$ is the number of initial black squares), no squares are black.

See Solution

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**p.336, icon at Example 5**

**#1.** Use the well-ordering property directly to show that if you can reach the first rung of an infinite ladder and if for every positive integer, if you can reach the $n$th rung, then you can reach the $(n + 1)$st rung, then you can reach every rung.

See Solution