

DISCUSSION FOR THIRD TUTORIAL

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From: *The Art and Craft of Problem Solving*, by Paul Zeitz.

Lockers in a row are numbered 1, 2, 3, ..., 1000. At first all of the lockers are closed. A person walks by and opens every other locker, starting with locker # 2. Another person walks by, and changes the 'state' (i.e. closes a locker if it is open, opens a locker if it is closed) of every third locker, starting with locker # 3. Then another person changes the state of every fourth locker, starting with #4, etc. This process continues until no more lockers can be altered. Which lockers will be closed? Why?

Now consider the same game except that when they walk by they start at the first locker, that is, the first person opens the odd number lockers (1,3,5,7,9, ...), the second person opens every third locker (1,4,7,10,13, ...), the third person opens every fourth locker (1,5,9,13,17, ...), etc. How does your answer change? Why?