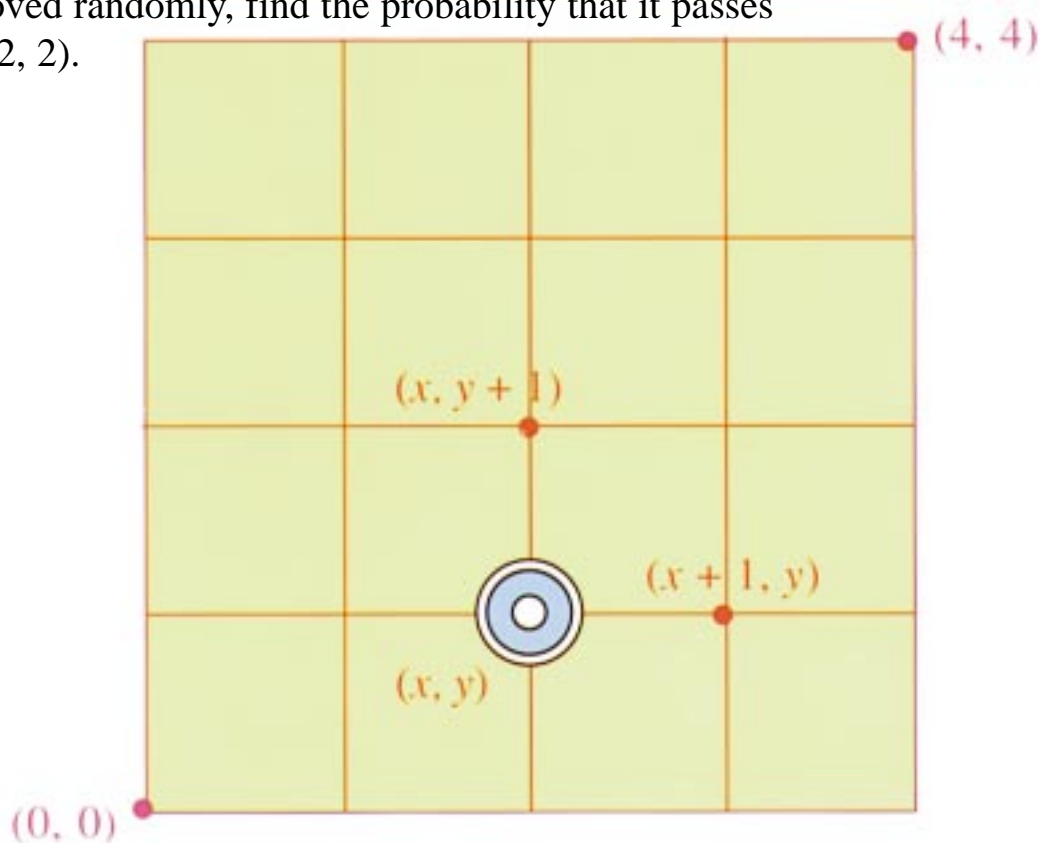


The Problem

A circular marker in a board game at point (x, y) is allowed to be moved to the point $(x + 1, y)$ or to the point $(x, y + 1)$, but not both. If the marker starts at $(0, 0)$ and ends at $(4, 4)$ and is moved randomly, find the probability that it passes through $(2, 2)$.



Strategies and Hints

1. Find the number of paths from $(0, 0)$ to $(4, 4)$. The answer will use factorials.
2. Find the number of paths from $(0, 0)$ to $(2, 2)$ and the number from $(2, 2)$ to $(4, 4)$. What does the product of these numbers represent?
3. Devise a random method of deciding where the marker should land on each move. If two people were to play a game of this type, how could you determine which person wins?