

Pilgrim's Puzzle



The Pilgrim is walking to the shrine at the SE corner of Duona. When she arrives, she'll have to pay a tax determined by her path. The tax she owes starts at 0 silver.

- When she travels a block East, she owes 2 more silver.
- When she travels a block West, she owes 2 less silver.
- When she travels a block South, the tax she owes doubles.
- When she travels a block North, the tax she owes is halved.

1. How can the pilgrim travel to the southeast corner of Duona without owing or receiving any silver?
2. Can the pilgrim make the trip without covering the same segment of street more than once?
3. (Greedy Pilgrim Variation) What's the most the Pilgrim can *earn* without repeating the same segment of street more than once?

4. If all the 2s in the compass rose were replaced by 3s, would this puzzle still be solvable?
5. What if all the 2s were replaced by 4s?
6. For what values of n can you replace the 2s and still solve the puzzle?
7. What if n can be a fraction? Is the puzzle solvable if $n = 1/3$?
8. Is the puzzle solvable if $n = \sqrt{2}$?