

A Map and Buried Treasure

1. The Map

A Calculus student finds an old document left by her grandfather. The document gives specific directions for reaching a certain island. On this island, she has to locate a specific oak tree, a specific pine tree and a gallows. She is asked to start from the gallows and march up to the oak tree counting the number of steps needed to reach the oak tree. At the oak tree, she must turn to the right (90 degrees) and march the same number of steps. At this spot she must put a spike in the ground. She must then return to the gallows and then march to the pine tree counting the number of steps needed to reach the pine tree. At the pine tree, she must now turn to the left (90 degrees) and march the same number of steps. At the second spot she has to put another spike in the ground. She must then dig at the midpoint of the line segment connecting the two spikes to recover the treasure buried there.

Use a straight-edge to draw a large map.

2. The Problem

Upon reaching the island, she easily finds the specific oak tree and the specific pine tree. However, much to her dismay, she cannot locate the gallows. Rain and decay completely obliterated any traces of the place where the gallows once stood.

Can the student still find the treasure? Explain why or why not.

Revisiting the Coin Toss Game

3. The coin toss game has a player throw a coin onto a table with a grid of congruent squares painted on the table top. You win if your coin lands inside a square (without touching a line). Assume S is the length of a side of a square and R is the radius of the coin.
 - (a) Find the probability of making a prize winning toss (in terms of R and S).
 - (b) Explain how you model the *sample space*.
 - (c) What assumptions are you making?
 - (d) How do you model the *event space*?

Another Probability Question – Dropping nails4. *Dropping Nails*

Suppose we have a floor made of parallel strips of wood, each the same width, say w . Now drop carpenter's nails of length l onto the floor.

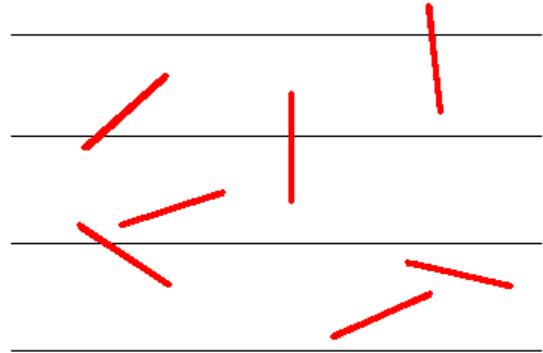


Diagram shows a small sample

- Assuming $l = w$ what is the probability that a nail crosses a line between two strips?