Kaan Aksoy — Feb 13, 2020

Coin in Square

We would like to compute the probability of a 3/4-inch diameter coin landing on a table covered by a grid of 1 by 1 inch squares without touching the edges of any square.

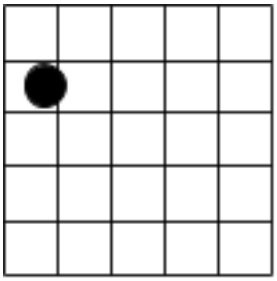

Figure 1: Coin landing on an edge of the square grid

To calculate this probability, consider a single square on the grid. Then, consider the center of the landed coin as a point in that square. In order for the coin to not be touching the square, the center of the coin must be within a 1/4 by 1/4 area at the center of the square:

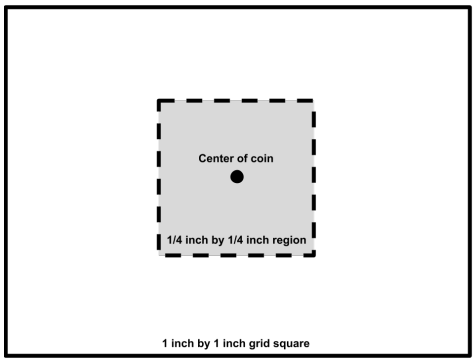

Figure 2: Caption

Thus, for one grid square, the probability of the coin not touching an edge is:

$$\frac{\left(\frac{1}{4}\right)^2}{(1)^2} = \frac{1}{16}$$

When considering an arbitrarily large grid, this probability remains the same, since adding more squares to the grid does not affect the overall proportion of places the coin can land without touching an edge. Thus, the final answer is $\frac{1}{16}$.