

## The Problem of the Month

### June 2021

Take a standard deck of 52 playing cards and place them on the table, face down. Let us say that the top card is in position 1 and the bottom card is in position 52 and the other card positions are numbered accordingly. Cut the deck precisely in two and take the portion that was the top 26 cards in your right hand and the bottom portion in your left. Execute a perfect riffle shuffle interlacing the cards from each hand such that the bottom card in your left hand goes on the bottom followed by the bottom card in your right hand, and so on. In this way, when you are done, the bottom card of the deck will remain on the bottom and the top card will remain on the top. This is called a perfect out-shuffle. (Surprisingly, executing 8 perfect out-shuffles in a row will return each card in the deck to its initial position!) Find all positions in the deck, other than 1 and 52, that return to their initial spot after executing two perfect out-shuffles.

