The October Problem of 2013:

From a standard deck of 52 cards five cards are drawn by the victim and shown to the assistant of the magician. The Assistant picks 4 of these five cards and shows them to the magician. The magician guesses the fifth card.

Solution:

The trick is that the magician and his assistant have agreed on a certain order of the 52 cards. When handing over the four cards to the magician, the assistant will have arranged them in an order that is a certain permutation from the agreed order of the whole deck.

By the pigeon hole principle, there is at least one suit which appears twice in the deck of 5 cards. The assistant picks the one from such a pair which has position less or equal to 6 (modulo 12) above the position of the other card of this pair (left in the stack handed to the magician). With the remaining three cards he encodes what has to be added to the value of the first card in order to obtain the value of the other.