

Solution by Humberto Raya.

Suppose that you have two shuffled poker decks with one on top of the other. Each deck will have 52 cards. Note that the value of the number of cards that are within a card C in the top deck and the same card C in the bottom deck is the sum of the number of cards that are under card C in the first deck plus the number of cards that are above card C in the bottom deck. Therefore the count of cards between all possible cards C in the first deck and cards C in the second deck is equal to the sum of cards under every card C in the first deck plus the sum of cards above every card C in the second deck. Notice that the sum of

cards under every card C in the first deck is equal to $\sum_{i=1}^{51} i$, since the top card in

the top deck will have 51 cards under it which are also in the top deck. The card under it will have 50 cards under it and so on. Similarly, the sum of cards above

every card C in the second deck will equal $\sum_{i=1}^{51} i$, since the bottom card in the

bottom deck will have 51 cards above it which are also in the bottom deck. The card above it will have 50 cards above it and so on. Therefore, the count of cards between all possible cards C in the first deck and cards C in the second deck is equal to the constant

$$\sum_{i=1}^{51} i + \sum_{i=1}^{51} i = 2((51)(52)/2) = 51 \cdot 52 = 2652.$$