

Two sequence based card tricks.

October 10, 2011

Sequences and Card Tricks

Example (**Card trick No. 1**)

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- 1 *Take a 52 sorted deck of cards.*

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- ② *Shuffle the deck three times (butterfly shuffle).*

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- 1 Take a 52 sorted deck of cards.
- 2 Shuffle the deck three times (butterfly shuffle).
- 3 Cut the deck in "half"

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Example (Card trick No. 1)

- 1 Take a 52 sorted deck of cards.
- 2 Shuffle the deck three times (butterfly shuffle).
- 3 Cut the deck in "half"
- 4 Have someone choose a card from the top of one of the halves and look at it.

Sequences and Card Tricks

Example (Card trick No. 1)

- 1 *Take a 52 sorted deck of cards.*
- 2 *Shuffle the deck three times (butterfly shuffle).*
- 3 *Cut the deck in "half"*
- 4 *Have someone choose a card from the top of one of the halves and look at it.*
- 5 *Place the card on the other half and put the half on top of it so the card he chose is somewhere in the middle.*

Sequences and Card Tricks

Example (Card trick No. 1)

- 1 Take a 52 sorted deck of cards.
- 2 Shuffle the deck three times (butterfly shuffle).
- 3 Cut the deck in "half"
- 4 Have someone choose a card from the top of one of the halves and look at it.
- 5 Place the card on the other half and put the half on top of it so the card he chose is somewhere in the middle.
- 6 Now find the card!

Example (Card trick No. 2)

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① *Pre-arrange the cards*

$A\clubsuit, 2\clubsuit, \dots, 7\clubsuit, A\diamondsuit, \dots, 8\diamondsuit, A\heartsuit, \dots, 8\heartsuit, A\spadesuit, \dots, 8\spadesuit$ as follows:

Example (Card trick No. 2)

① *Pre-arrange the cards*

$A_{\clubsuit}, 2_{\clubsuit}, \dots, 7_{\clubsuit}, A_{\diamond}, \dots, 8_{\diamond}, A_{\heartsuit}, \dots, 8_{\heartsuit}, A_{\spadesuit}, \dots, 8_{\spadesuit}$ as follows:

i $A_{\clubsuit} \rightarrow 00001$

Example (Card trick No. 2)

① *Pre-arrange the cards*

$A_{\clubsuit}, 2_{\clubsuit}, \dots, 7_{\clubsuit}, A_{\diamond}, \dots, 8_{\diamond}, A_{\heartsuit}, \dots, 8_{\heartsuit}, A_{\spadesuit}, \dots, 8_{\spadesuit}$ as follows:

i $A_{\clubsuit} \rightarrow 00001$

ii *Add the first and third bit mod2 and tack it at the end. Delete the leading bit: 00010.*

Example (Card trick No. 2)

① *Pre-arrange the cards*

$A_{\clubsuit}, 2_{\clubsuit}, \dots, 7_{\clubsuit}, A_{\diamond}, \dots, 8_{\diamond}, A_{\heartsuit}, \dots, 8_{\heartsuit}, A_{\spadesuit}, \dots, 8_{\spadesuit}$ as follows:

- i $A_{\clubsuit} \rightarrow 00001$
- ii *Add the first and third bit mod2 and tack it at the end. Delete the leading bit: 00010.*
- iii *The next two sequences will be: 00100, 01001*

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- iv *Repeat until all 31 binary sequences are generated.*

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② *For each sequence place the following card on the deck:*

③ *The first two bits are the suit: 00 $\rightarrow \clubsuit$, 01 $\rightarrow \spadesuit$, 10 $\rightarrow \diamond$, 11 $\rightarrow \heartsuit$*

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$A_{\clubsuit}, 2_{\clubsuit}, \dots, 7_{\clubsuit}, A_{\diamond}, \dots, 8_{\diamond}, A_{\heartsuit}, \dots, 8_{\heartsuit}, A_{\spadesuit}, \dots, 8_{\spadesuit}$ as follows:

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③ *The first two bits are the suit: 00 $\rightarrow \clubsuit$, 01 $\rightarrow \spadesuit$, 10 $\rightarrow \diamond$, 11 $\rightarrow \heartsuit$*

④ *The next three bits are the binary representation of the card value (000 \rightarrow 8).*

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① *Pre-arrange the cards*

$A_{\clubsuit}, 2_{\clubsuit}, \dots, 7_{\clubsuit}, A_{\diamond}, \dots, 8_{\diamond}, A_{\heartsuit}, \dots, 8_{\heartsuit}, A_{\spadesuit}, \dots, 8_{\spadesuit}$ as follows:

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⑤ *Finally $R \rightarrow 1$, $B \rightarrow 0$.*

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⑥ *Have someone cut the deck anywhere he wants.*

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ii Add the first and third bit mod2 and tack it at the end. Delete the leading bit: 00010.

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⑥ Have someone cut the deck anywhere he wants.

⑦ Have him pick five consecutive cards and tell you their colors in order they were picked. For instance: **R B B R B** (10010 \rightarrow 2 \diamond).

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⑧ Tell him what the 5 cards are, put them back and repeat the "magic".

Bijections based card trick

- 1 Start with a randomly ordered deck of 52 cards.

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- 2 Have your partner wait outside the room.
- 3 Have any person select five cards.
- 4 You select four cards, put them in an envelop and send them to your partner.

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- 5 Your partner sends back the identification of the fifth card.

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- 6 How can it be done?

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- 7 **Think bijections!**