Counting

Counting cards

1. How many 4-card hands are there from a standard 52-card deck (order is not important)
2. How many 4-card hands contain only face cards (A, J, Q, K)?
3. How many 4-card hands contain at least one queen?

Counting cards

1. How many 4-card hands are there from a standard 52-card deck (order is not important) (52 choose 4)
2. How many 4-card hands contain only face cards (A, J, Q, K)?
3. How many 4-card hands contain at least one queen?

Counting cards

1. How many 4-card hands are there from a standard 52-card deck (order is not important) (52 choose 4)
2. How many 4-card hands contain only face cards (A, J, Q, K)? (16 choose 4)
3. How many 4-card hands contain at least one queen?

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1. How many 4-card hands are there from a standard 52-card deck (order is not important) (52 choose 4)
2. How many 4-card hands contain only face cards (A, J, Q, K)? (16 choose 4)
3. How many 4-card hands contain at least one queen?
   - One approach: #hands with exactly 1 queen + #hands with exactly 2 + #hands with exactly 3 queens + #hands with exactly 4 queens

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2. How many 4-card hands contain only face cards (A, J, Q, K)? (16 choose 4)
3. How many 4-card hands contain at least one queen?
   - One approach: #hands with exactly 1 queen + #hands with exactly 2 + #hands with exactly 3 queens + #hands with exactly 4 queens =
     (4 choose 1)*(48 choose 3) + (4 choose 2)*(48 choose 2) + (4 choose 3)*(48 choose 1) + 1
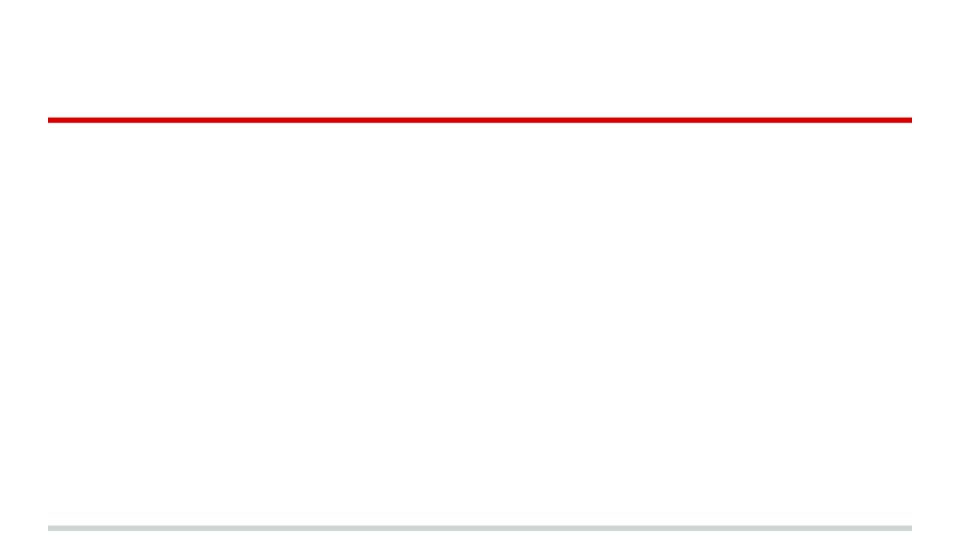
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     (4 choose 1)*(48 choose 3) + (4 choose 2)*(48 choose 2) + (4 choose 3)*(48 choose 1) + 1
   - Simpler: #total hands - #hands with no queens

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   - One approach: #hands with exactly 1 queen + #hands with exactly 2 + #hands with exactly 3 queens + #hands with exactly 4 queens =
     (4 choose 1)*(48 choose 3) + (4 choose 2)*(48 choose 2) + (4 choose 3)*(48 choose 1) + 1
   - Simpler: #total hands - #hands with no queens =
     (52 choose 4) - (48 choose 4)

Questions taken from Professor Sahai's homework, spring 13

Counting cards (cont)

1. How many 4-card hands contain two cards of one suit and two of a different suit?

1. How many 4-card hands contain a contiguous sequence of four values (eg 4, 5, 6, 7 or A, 2, 3, 4)? Ace may be treated as either a high card or a low card.

Counting cards (cont)

1. How many 4-card hands contain two cards of one suit and two of a different suit?

   (which suits)

   (4 choose 2)

1. How many 4-card hands contain a contiguous sequence of four values (eg **4, 5, 6, 7** or **A, 2, 3, 4**)? Ace may be treated as either a high card or a low card.

Counting cards (cont)

1. How many 4-card hands contain two cards of one suit and two of a different suit?

   (which suits)*(which cards from first suit)

   (4 choose 2)*(13 choose 2)

1. How many 4-card hands contain a contiguous sequence of four values (eg **4, 5, 6, 7** or **A, 2, 3, 4**)? Ace may be treated as either a high card or a low card.

Counting cards (cont)

1. How many 4-card hands contain two cards of one suit and two of a different suit?

   (which suits)*(which cards from first suit)*(which from second suit)

   (4 choose 2)*(13 choose 2)*(13 choose 2)

1. How many 4-card hands contain a contiguous sequence of four values (eg **4, 5, 6, 7** or **A, 2, 3, 4**)? Ace may be treated as either a high card or a low card.

Questions taken from Professor Sahai's homework, spring 13

Counting cards (cont)

1. How many 4-card hands contain two cards of one suit and two of a different suit?

   (which suits)*(which cards from first suit)*(which from second suit)

   (4 choose 2)*(13 choose 2)*(13 choose 2)

1. How many 4-card hands contain a contiguous sequence of four values (eg **4, 5, 6, 7** or **A, 2, 3, 4**)? Ace may be treated as either a high card or a low card.

   (which sequence)   = 11

Counting cards (cont)

1. How many 4-card hands contain two cards of one suit and two of a different suit?

    (which suits)*(which cards from first suit)*(which from second suit)
    (4 choose 2)*(13 choose 2)*(13 choose 2)

1. How many 4-card hands contain a contiguous sequence of four values (eg **4, 5, 6, 7** or **A, 2, 3, 4**)? Ace may be treated as either a high card or a low card.

    (which sequence)*(suits of the cards in the sequence) = 11*4^4