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Help

## U1 (1/1 point)

If we want to use positive integers from 1 until 7 to form a ring in order. Since 1 and 7 are adjacent to each other in the ring. Due to their neighboring position, 1 and 7 are also considered as neighbor numbers. Then if we want to pick 3 non-neighboring numbers from this ring of 7 numbers, how many different solutions are there? \_\_\_\_ 【Fill in the blank, please calculate the exact number】

Answer: 7

## EXPLANATION

$C(n-k+1, k) - C(n-k-1, k-2) = n \cdot C(n-k, k) / (n-k)$ ; Among them  $n=7, k=3$ , which is the combination number of non-neighboring of normal non-circular ring, minus out 1 and 7 are obtained at the same time.

Final Check

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## U2 (1/1 point)

What is the next permutation for sequence "315498762" with lexicographical order

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## U3 (1/1 point)

In a Golden Fraud card game (A popular poker game in China), use a deck of cards which have jokers removed, in total there are 4 shapes with 52 cards, players compete their win/lose by the 3 cards in the hands, there are different card patterns in the rules:

Leopard: 3 identical cards, for example AAA or 222.

Shun Jin(Flush): Straight with identical shape, such as Spade 456 or Heart 789.

Golden Flower: Identical shape, non-straight. For example, Spade 368 and Diamond 145.

Straight: Straight with different shape, for example, Spade 5 Heart 6 Diamond 7.

Pair: 2 identical cards, such as 223 and 334.

Random: 3 cards which do not fall under any card pattern.

Special: 235 with different shapes. (Due to that different area may contain different card rules, it is not being considered under this question)

Then, if we consider the probabilities for those patterns, how to order them?:

- ☐ *Leopard < Flush < GoldenFlower < Straight < Pair < Random*
- ☐ *Leopard < Flush < Straight < GoldenFlower < Pair < Random*
- ☐ *Flush < Leopard < GoldenFlower < Straight < Pair < Random*
- ☐ *Leopard > Flush > GoldenFlower > Straight > Pair > Random*
- ☒ *Flush < Leopard < Straight < GoldenFlower < Pair < Random* ✓

#### EXPLANATION

The solution number of Leopard is 13 types; whereas pick 3 from 4 shapes is  $C(4,3)$ , the solution number is  $13 * C(4, 3) = 52$

The possible solution number of Shun Jin (Flush) is each shape from A12 to QKA contains 12 Straight, the whole deck of cards contains 48 different kinds of Flush.

Golden Flower: 3 cards with the same shape but not a Flush

3 cards with the same shape, pick one from 4 types of shape, pick 3 cards from the 13 cards

$4 * C(13,3) = 1144$ , remove 48 Flush, Golden Flower, the solution number is 1096

Straight A12 to QKA contains 12 Straight, 3 cards, each contains 4 shapes, therefore the number of Straight (needs to remove Flush)

$12 * 4^3 - 48 = 720$

Pair: There are 2 identical number from the 3 cards, another one is different,  $C(13,2) * 2 * 4 * C(4,2) = 3744$

All the solution number is  $C(52,3)=22100$

The probability of Leopard is:  $52/22100=0.235\%$

The probability of Flush is:  $48/22100=0.217\%$

The probability of Golden Flower is:  $1096/22100=4.96\%$

The probability of Straight is:  $720/22100=3.26\%$

The probability of Pair is:  $3744/22100=16.9\%$

The probability of Random is:  $16440/22100=73.49\%$

Final Check

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