$$\binom{2n}{n} = \binom{n}{0}^2 + \binom{n}{1}^2 + \dots + \binom{n}{n}^2$$

$$2^n = \binom{n}{0} + \dots + \binom{n}{n}$$

$$0 = \binom{n}{0} - \binom{n}{1} + \binom{n}{2} - \dots \binom{n}{n}$$

$A = \{a_1, \dots, a_n\}$

$B = \{b_1, \dots, b_n\}$

$C = A \cup B$

$A \cap B = \emptyset$

$|C| = 2n$

n-prvkové podmn. mn. C

$$\binom{2n}{n} = \binom{n}{0}\cdot\binom{n}{n} + \binom{n}{1}\binom{n}{n-1} + \binom{n}{2}\cdot\binom{n}{n-2} + \dots + \binom{n}{n-1}\cdot\binom{n}{1} + \binom{n}{n}\cdot\binom{n}{0}$$

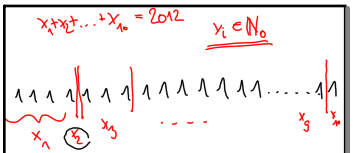
$$\binom{n}{k} = \binom{n}{n-k}$$

$$= \binom{n}{0}\cdot\binom{n}{0} + \binom{n}{1}\cdot\binom{n}{1} + \dots + \binom{n}{n}\binom{n}{n}$$

$$= \binom{n}{0}^2 + \binom{n}{1}^2 + \dots + \binom{n}{n}^2$$

2 29-17:47

$x_1 + x_2 + \dots + x_{10} = 2012$ $\quad x_i \in \mathbb{N}_0$



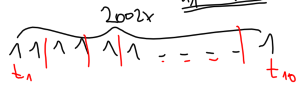
2011 ... 1

9 ... přístek

2021 do. $\boxed{\frac{2021!}{2012!\,9!}}$

$x_1 + \dots + x_{10} = 2012$ $\quad x \in \mathbb{N}$

$t_1 + \dots + t_{10} = 2002$ $\quad x_i = t_i + 1$

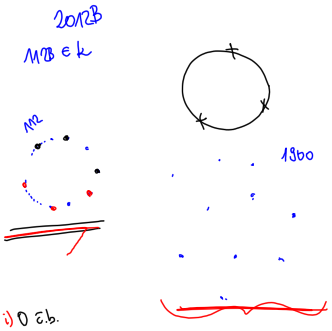


$$\frac{2011!}{2002!\,9!}$$

2 29-18:12

2012B

MB ∈ k



i) 0 č.b. $\binom{1800}{3}$

ii) 1 č.b. $\binom{M2}{1}\cdot\binom{1800}{2}$

iii) 2 č.b. $\binom{M2}{2}\cdot\binom{1800}{1}$

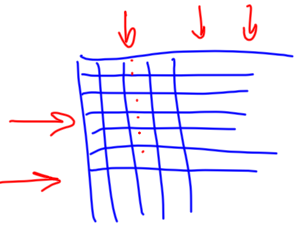
iv) 3 č.b. 1

+

2 29-18:19

n × n polí

k věží



k sloupců

$$\frac{\binom{n}{k}\cdot n\cdot(n-1)\cdot\ldots\cdot(n-k+1)}{\binom{n}{k}\cdot\binom{n}{k}\,k!}$$

S S

2 29-18:24

1, ..., 100

5 6

55

S S

L L

$\binom{50}{2}$

$\binom{50}{2}$

$$2\binom{50}{2}$$

2 29-18:28

$|M| = n$ $\quad M = \{1,2,3\}$

$2^M = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$

$2\cdot 2\cdot 2 = 2^3$

$\boxed{2^n}$

$|M| = n$ $\quad A \subseteq B \subseteq M$

$M = \{1,2,3\}$

$A = \emptyset$ $\quad B = \emptyset$, $B = \{1\}$, $= \{2\}$, $= \{1,2\}$

$A = \{1\}$ $\quad B = \{1\}$

$A = \{1,2\}$ $\quad B = \{1,2\}$

$A = \{2\}$ $\quad B = \{2\}$, $= \{1,2\}$

$A = \{1,2\}$ $\quad B = \{1,2\}$

$x \in A$ $\quad x \in B$

$x \notin A$ $\quad x \notin B$

$x \notin A$ $\quad x \in B$

kom! $x \in A$ $\quad x \notin B$

x ... 3 možnosti

3^n

2 29-18:31

32 karet (4 barvy)

6 karet

1 barva	3x	3 barvy	1x
2 barvy	2x	2 barvy	1x

i) $4\cdot\binom{8}{3}\cdot\binom{8}{1}\cdot\binom{8}{1}\cdot\binom{8}{1}$ +

B ← 3x

ii) $\binom{4}{2}\binom{8}{2}\cdot\binom{8}{2}\binom{8}{1}\binom{8}{1}$

B

2 29-18:37

$4\cdot3\cdot2\cdot1 = 4! = 24$

24

6 ... 1
6 ... 2
6 ... 3
6 ... 4

6 ... 1
6 ... 2
6 ... 3
6 ... 4

6 ... 1
6 ... 2
6 ... 3
6 ... 4

6 ... 1
6 ... 2
6 ... 3
6 ... 4

$6(1+2+3+4)$

$6\cdot10\cdot(1+2+3+4)$

$6\cdot100\cdot(1+2+3+4)$

$6\cdot1000(1+2+3+4)$

$6666\cdot(1+2+3+4) = 66\ 660$

2 29-18:42

$\frac{1}{6}\cdot\frac{1}{6}\cdot\frac{1}{6} = \left(\frac{1}{6}\right)^3 = \frac{1}{6}$

1 1 1
1 1 1

1...6
1...6
1...6

1 1 6
1 2 5
1 3 4
1 4 3
1 5 2
1 6 1
2 2 4
2 3 3

$3\cdot3\cdot\frac{1}{6}\cdot\frac{1}{6}\cdot\frac{4}{6}$
$2\cdot3\cdot\frac{1}{6}\cdot\frac{1}{6}\cdot\frac{4}{6}$ + $\frac{21}{216}$

$\left(\frac{4}{6}\right)^3$

$P(J) = 1 - P(\bar{J})$

$P(J) = 1 - P(\bar{J})$

$\bar{J}$ ... nenastane součet, který není 3

nenastane 1 ... $1 - \frac{4}{8} = \frac{3}{8}$

nenastane 2 ... $1 - \frac{21}{216} = \frac{195}{216}$

nenastane 3 ... $1 - \frac{3}{8} = \frac{5}{8}$

nenastane 1 ∧ nenastane 2

ne Σ ... 3

ne ∀ součet

$\boxed{\frac{5^3}{6^3}}$ $\frac{5^3-1}{6^3}$

nenastane 1 ∧ nenastane 3

n ∀ sudé, ne všechny stejné

2 29-18:49

1 právě jedenkrát

1

9 10 10 10 10 10

0

$6\cdot9^5 - 5\cdot9^4$

$9\cdot10^5$

2. 7 a 9 právě dvakrát

0

$\binom{5}{2}\cdot\binom{4}{2}\cdot8\cdot8 - \binom{5}{2}\cdot\binom{3}{2}\cdot9$

$9\cdot10^5$

$\binom{5}{2}\cdot\binom{3}{2}$

$9\cdot10^5$

$1 - \frac{5^6}{9\cdot10^5}$

5 5 5 5 5 5

2 29-19:07

62

70

12 20 13

2 0 0
0 2 0
0 0 2

$\frac{6}{13}\cdot\frac{7}{12}\cdot\frac{6}{11} + \frac{7}{13}\cdot\frac{6}{12}\cdot\frac{6}{11} +$

$+ \frac{7}{13}\cdot\frac{6}{12}\cdot\frac{6}{11}$

2 29-19:14

0,4

$1 - (0{,}6)^n \geq 0{,}99$

$-(0{,}6)^n \geq -0{,}01$

$(0{,}6)^n \leq 0{,}01$

$\log(0{,}6)^n \leq \log 0{,}01$

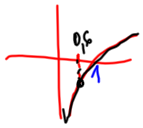
$n\log 0{,}6 \leq \log 0{,}01$

$n \geq \frac{-2}{\log 0{,}6}$

$n \geq 10$

$\log a^n = n\log a$

/log



2 29-19:17

$$\frac{\binom{13}{5}\cdot 4^5}{\binom{52}{5}}$$

B B

$$\frac{4\cdot\binom{13}{5}}{\binom{52}{5}}$$

$$\frac{\binom{4}{3}\cdot\binom{4}{2}}{\binom{52}{5}}$$

$$\frac{\frac{4}{52}\cdot\frac{3}{51}\cdot\frac{2}{50}\cdot\frac{4}{49}\cdot\frac{3}{48}}{5!}$$

2 29-19:23

$$1 - \frac{1}{n!}$$

n klobouků

n lidí

2 29-19:30

$$\boxed{\frac{\binom{12}{2}\cdot\binom{10}{2}\cdot\binom{8}{2}\cdot\binom{6}{2}\cdot\binom{4}{2}\binom{2}{2}}{6^{12}}}$$

$$\binom{12}{2}\cdot\frac{1}{6}\cdot\frac{1}{6}\cdot\binom{10}{2}\cdot\frac{1}{6}\cdot\frac{1}{6}\cdot\binom{8}{2}\cdot\frac{1}{6}\cdot\frac{1}{6}\cdots\binom{2}{2}\cdot\frac{1}{6}\cdot\frac{1}{6}$$

2 29-19:32