Жихарев 0362   Вариант 6

1. $C_{12}^9 = C_{12}^3$

2. C_{374}^{94}

3. $12 \cdot 13^9 - 12^{10} = 65336628252$

4. 2985

5. 37

6. 2547136

7. а) $N = 17$ или 33

   б) $C_{21}^4 - 5 C_{11}^4$

8. $\dfrac{29}{170}$

N1

$$\underbrace{1 \ldots \ldots \ldots 1}_{14} \; ; \; 0 \times 9$$

$$C_{12}^9 = C_{12}^3$$

Ответ: C_{12}^3

N2

$$x_1 + \ldots + x_{95} = 185 \qquad x_i \geqslant -1$$

$$y_i = x_i + 2 ; \; y_i \geqslant 1$$

$$y_1 + \ldots + y_{95} = 185 + 2 \cdot 95 = 375$$

Ответ: C_{374}^{94}

N3

$$12 \cdot 13^9 - 12^{10} = 65336628252$$

```
   144                 42998 1696        42998 1696
 × 144             ×             144    ×         144
   576                 171992 6784       171992 6784
  576                17199267 84        17199267 84
 144                 42998 1696          42998 1696
 20736               619173 64224        619173 64224
×20736                                  -127253992
 124416
 62208              169
145152           × 169
1472               169
                   1521
42998 1696         1014

                   169
                 ×28561            169
                  28561
                  28561
                 28561

                  171366
                 142805
                228488
                57122

× 8 15730 721
          156
 48 4384 326
 40786 33605
 815730 721
-12725399 2476
  619173 64224
  65336628252
```

Ответ: $12 \cdot 13^9 - 12^{10} = 65336628252$

№4

$n = 3$

$A = \{a, b, c\}$

$i_{bbaaclobc}?$

$a = 0$
$b = 1$
$c = 2$

$11002112_3 + 1_3 = 11002120_3$

$2 \cdot 3 + 9 + 2 \cdot 27 + 3^5 + 3^7 =$

$81 \cdot 9 \quad 81 \cdot 27$

$= 6 + 9 + 54 + 729 + 2187 =$

$= 2985$

$$\begin{array}{r} 81 \\ \times\ 27 \\ \hline 567 \\ 162 \\ \hline 2187 \end{array}$$

$$\begin{array}{r} 2187 \\ 729 \\ + 54 \\ + 9 \\ + 6 \\ \hline 2985 \end{array}$$
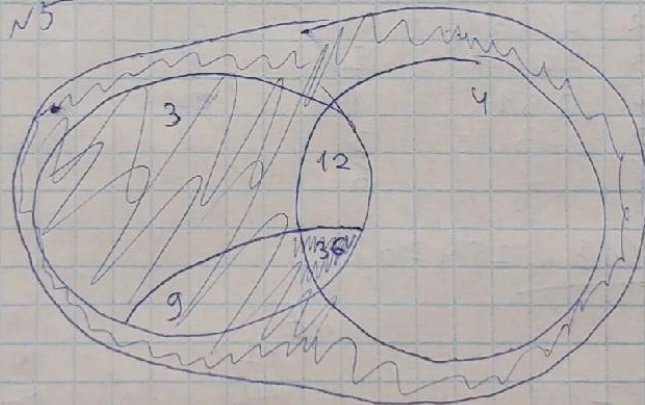
Ответ: 2985

№5

$\{A\} - 43$

$\{3\} - 29$

$\{4\} - 13$

$\{9\} - 9$

$\{12\} - 12$

$\{36\} - 7$

$\{\overline{4}\} \cup \{9\} - ?$

$\{\overline{4}\} \cup \{9\} = \{A\} - (\{4\} - \{36\}) =$

$= 43 - 13 + 7 = 37$

Ответ: 37

$n = 7$

$1147 - 1 = 1146$

$(1; 2; 3; 4; 5; 6; 7]$

$i = 1147$

$1146_{10} = (1\,3\,2\,3\,0\,0)!$

1	7654321	2
3	765431	5
2	76431	4
3	7631	7
0	631	1
0	63	3
0̸	6	6

Ответ: 254713 6

$x_1 x_2 x_3 x_4 x_5$ $\qquad$ $x_i \in [0; 10]$

1. $N-?$

$$x_1 + x_2 + x_3 + 3 = x_4 + x_5$$

① $\begin{cases} x_i = a; \ i \leq 3 \\ x_i = 10 - a_i, \ i > 3 \end{cases}$ $\qquad$ ② $\begin{cases} x_i = 10 - a_i, \ i \leq 3 \\ x_i = a_i, \ i > 3 \end{cases}$

① $a_1 + a_2 + a_3 + 3 = 10 - a_4 + 10 - a_5$

$$a_1 + a_2 + a_3 + a_4 + a_5 = 17$$

② $10 - a_1 + 10 - a_2 + 10 - a_3 + 3 = a_4 + a_5$

$$a_1 + a_2 + a_3 + a_4 + a_5 = 33$$

Ответ: $N = 17$ или 33

2. $a_1 + \ldots + a_5 = 17$ $\qquad$ $a_i \in [0; 10]$

2.1. $a_i \geq 0$

$y_i = a_i + 1; \ y_i \geq 1; \ y_1 + \ldots + y_5 = 17 + 5 = 22$

C_{21}^4

2.2. $a_1 > 10$

$a_1' = a_1 - 10, \ i > 1.$ $\qquad$ $a_i' = a_i + 1; \ a_i' \geq 1$

$\cancel{a_1' + a_2' + a_3' + a_4' + a_5' = 17 - 10 = 7}$ $\qquad$ $a_1' + a_2' + a_3' + a_4' + a_5' = 17 - 10 = 7$

$C_{7+5-1}^4 = C_{11}^4$

Ответ: $C_{21}^4 - 5 \cdot C_{11}^4$

$a_1 + \ldots + a_5 = 17 \qquad a_i \in [0; 10]$

II $\quad (1 + x + x^2 + \ldots + x^{10})^5 = \ldots + b_{17} x^{17} + \ldots$

$x^{17} = x^{y_1} \cdot x^{y_2} \cdot \ldots \cdot x^{y_5} = x^{y_1 + \ldots + y_5} \Rightarrow y_1 + \ldots + y_5 = 17$

$f = (1 + x + x^2 + \ldots + x^{10})^5 = \left(\dfrac{1 - x^{11}}{1 - x}\right)^5 = (1 - x^{11})^5 \left(1 + x + x^2 + \ldots\right)^5$

$S = 1 + x + \ldots x^{10}$

$xS = x + x^2 + \ldots + x^{11}$

$xS - S = x^{11} - 1 = S(x - 1) \Rightarrow S = \dfrac{x^{11} - 1}{x - 1} = \dfrac{-(1 - x^{11})}{-(1 - x)} =$

$= \dfrac{1 - x^{11}}{1 - x}$

$\dfrac{1}{1 - x} = 1 + x + x^2 + \ldots + x^n +$

$(1 - x^{11})^5 = 1 - 5x^{11} + \ldots$

$(1 + x + x^2 + \ldots + x)^5 = C_{21}^4 x^{17} + C_{11}^4 x^6 + \ldots$

$(1 - 5x^{11})(\ldots + C_{21}^4 x^{17} + C_{11}^4 x^6) = \left(C_{21}^4 - 5C_{11}^4\right) x^{17}$

Ответ: $C_{21}^4 - 5C_{11}^4$

$\begin{matrix} C & -14 \\ 3 & 3 \end{matrix}$

$n =$

$1 - \dfrac{\overset{7}{\cancel{14}}}{\underset{14 + 3}{\cancel{14} + 3}} \cdot \dfrac{13}{\underset{4}{\cancel{13} + 3}} \cdot \dfrac{\overset{1}{\cancel{\overset{4}{\cancel{12}}}}}{\underset{5}{\cancel{12} + 3}} = 1 - \dfrac{7 \cdot 13}{170} = \dfrac{79}{170}$

Ответ: $\dfrac{79}{170}$