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Вариант 24

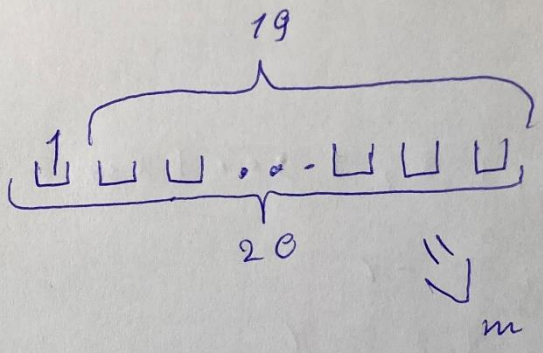
Таблица 1. Ответы к задачам.

№	Ответ:
1	C_{19}^{16}
2	C_{295}^{59}
3	5159780352 = 12^9
4	10844
5	125
6	3142465
7	I Ответ: N = 18 или 30; II Ответ: $C_{23}^{5} - 6 \cdot C_{14}^{5} = 21634$
8	0,89

№ 1

$n = 16$

$m = 20$



$m = 19$

Ответ: C_{19}^{16}

№ 2

$x_1 + x_2 + \dots + x_{60} = 175$, где $x_i \geq -1$

$x_i \geq -1$

$x_i + 2 \geq 1$

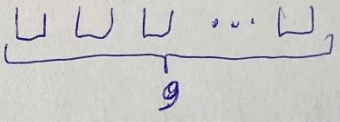
$y_i = x_i + 2$; $y_i \geq 1$

$y_1 + y_2 + \dots y_{60} = 175 + 2 \cdot 60 = 175 +$
$+ 120 = 295$

Ответ: $C_{295}^{60-1} = C_{295}^{59}$

№ 3

12^9



$12^9 = 144 \cdot 144 \cdot 144 \cdot 144 \cdot 12 = 20736 \cdot$
$\cdot 20736 \cdot 12 = 429981696 \cdot 12 =$
$= 5159780352$

Ответ: 5159780352 (12^9)

№ 4

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

$a = 0$

$b = 1$

$c = 2$

$d = 3$

$e = 4$

$d\ c\ b\ d\ d\ e = 3\ 2\ 1\ 3\ 3\ 4_5$

$\overset{5}{3}\ \overset{4}{2}\ \overset{3}{1}\ \overset{2}{3}\ \overset{1}{3}\ \overset{0}{4}_5 = 3 \cdot 5^5 + 2 \cdot 5^4 +$

$+ 1 \cdot 5^3 + 3 \cdot 5^2 + 3 \cdot 5 + 4 \cdot 5^0 =$

$= 9375 + 1250 + 125 + 75 +$

$+ 15 + 4 = 10625 + 200 + 19 =$

$= 10844_{10}$

Ответ: 10844

№ 5

168

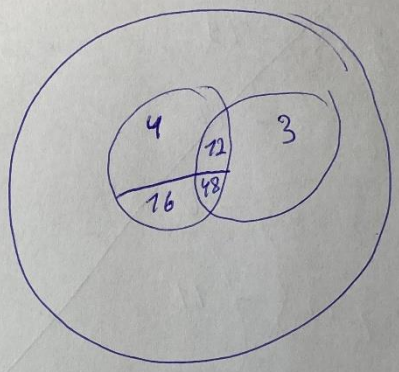
{4} - 69

{3} - 48

{16} - 6

{12} - 11

{48} - 5



$\{\bar{3}\}$ или $\{16\}$ (=)

$\{\bar{3}\} = 168 - \{3\} =$

$= 168 - 48 = 120$

(=) $120 + 5 = \{\bar{3}\} +$

$+ \{48\} = 125$

Ответ: 125

№ 6

$1538 - 1 = 1537$

$1537 = 768 \cdot 2 + 1$

$768 = 256 \cdot 3 + 0$

$256 = 64 \cdot 4 + 0$

$64 = 12 \cdot 5 + 4$

$12 = 2 \cdot 6 + 0$

$2 = 0 \cdot 7 + 2$

$(204001)!$

2	7654321	3
0	765421	1
4	76542	7
0	6542	2
0	654	4
0	65	6
0	5	5

Ответ: 3172465

№ 4

а) $x_1\ x_2\ x_3\ x_4\ x_5\ x_6$ $\qquad x_i \in [0; 8]$

N - ?

$$x_1 + x_2 + x_3 + 6 = x_4 + x_5 + x_6$$

Два варианта:

①
$$\begin{cases} x_i = a_i, & i \leq 3 \\ x_i = 8 - a_i, & i > 3 \end{cases}$$

②
$$\begin{cases} x_i = 8 - a_i, & i \leq 3 \\ x_i = a_i, & i > 3 \end{cases}$$

① $a_1 + a_2 + a_3 + 6 = 8 - a_4 + 8 - a_5 + 8 - a_6$

$a_1 + a_2 + a_3 + a_4 + a_5 + a_6 = 18$

② $8 - a_1 + 8 - a_2 + 8 - a_3 + 6 = a_4 + a_5 + a_6$

$a_1 + a_2 + a_3 + a_4 + a_5 + a_6 = 30$

Проверка:

$$\begin{array}{r} 18 = 8 \cdot 3 - 6 \\ + \quad 30 = 8 \cdot 3 + 6 \\ \hline 48 = 8 \cdot 6 \end{array}$$

$N =$ 18 или 30

б)

I способ:

$x_1 + x_2 + x_3 + x_4 + x_5 + x_6 = 18$

1) $a_i \geq 0$

$C_{18+6-1}^{6-1} = C_{23}^{5}$

2) $a \geq 9$

$a_1' = a_1 - 9$

$a_1 - 9 + a_2 + a_3 + a_4 + a_5 + a_6 = 18 - 9$

$a_1' + a_2 + a_3 + a_4 + a_5 + a_6 = 9$

$C_{9+6-1}^{6-1} = C_{14}^{5}$

II способ: $a_1 + a_2 + a_3 + a_4 + a_5 + a_6 = 18 \qquad a_i \in [0; 8]$

$(1 + x + x^2 + x^3 + x^4 + x^5 + x^6 + x^7 + x^8)^6 = 1 + x^6 + x^{12} + x^{18} + x^{24} + x^{30} + x^{36} + x^{42} + x^{48}$

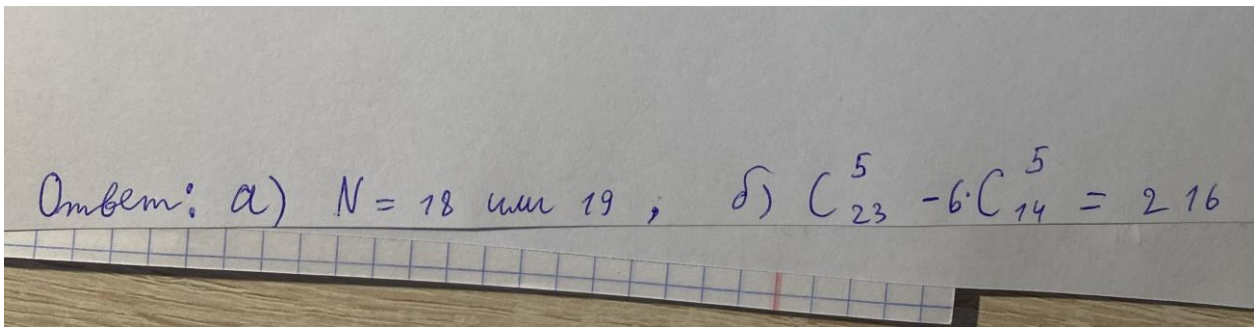
$(1 + x + x^2 + \dots x^8)^6 = \dots + a_{18} x^{18} + \dots$

$x^{18} = x^{y_1} \cdot x^{y_2} \cdot \dots \cdot x^{y_6} = x^{y_1 + y_2 + \dots + y_6}$

$18 = y_1 + \dots + y_6$

$f = (1 + x + x^2 + \dots + x^8)^6 = \left(\frac{1 - x^9}{1 - x}\right)^6 = \frac{(1 - x^9)^6}{(1 - x)^6} =$

$= (1 - x^9)^6 (1 + x + x^2 + \dots)^6 = (1 - 6x^9 + \dots) \cdot (\dots C_{23}^5 x^{18} + C_{14}^5 x^9) = \dots C_{23}^5 x^{18} - 6 \cdot C_{23}^5 x^{18} \dots = \dots x^{18}(C_{23}^5 - 6 C_{14}^5 \dots \Rightarrow C_{23}^5 - 6 C_{14}^5 = \frac{23!}{5! \cdot 18!} - 6 \cdot \frac{14!}{5! \cdot 9!} = 21634$


Ответ: а) $N = 18$ или 19, б) $C_{23}^{5} - 6 \cdot C_{14}^{5} = 216$

№ 8

3. ш – 9

О. ш – 17

Вар. – 2

$$\begin{cases} 33 & p_1 \\ 30 & p_2 \\ 03 & p_3 \\ 00 & p_4 \end{cases} \qquad p_1 + p_2 + p_3 + p_4 = 1 \qquad p_1 + p_2 + p_3 = 1 - p_4$$

$$1 - \frac{9}{9+17} \cdot \frac{8}{8+17} = 1 - \frac{9}{26} \cdot \frac{8}{25} = 1 - \frac{36}{325} = \frac{325-36}{325} =$$

$$= \frac{289}{325} = 0,88923\ldots \approx$$

$$\approx 0,89$$

Ответ: 0,89