2

	n	m	k	s
1	8	5	2	3
2	12	5	4	

Решение:

$$p = \sum C_{m_1}^{i_1} C_{n_1-m_1}^{k_1-i} C_{m_2}^{i_2} C_{n_2-m_2}^{k_2-i_2} \left(C_{n_1}^{k_1} C_{n_2}^{k_2}\right)^{-1} =$$

$i_1 + i_2 = S \Leftrightarrow i_2 = S - i_1 \Rightarrow$

$\Rightarrow k_2 - i_2 = k_2 - (S - i_1) = k_2 - S + i_1$

$$p = \sum_i C_{m_1}^{i} C_{n_1-m_1}^{k_1-i} C_{m_2}^{S-i} C_{n_2-m_2}^{k_2-S+i} \left(C_{n_1}^{k_1} C_{n_2}^{k_2}\right)^{-1}$$

$$\begin{cases} 0 \le i \le m_1 \\ 0 \le k_1 - i \le n_1 - m_1 \\ 0 \le S - i \le m_2 \\ 0 \le k_2 - S + i \le n_2 - m_2 \end{cases}$$

$0 \le k_1 - i \Leftrightarrow i \le k_1$

$k_1 - i \le n_1 - m_1 \Leftrightarrow k_1 + m_1 - n_1 \le i$

$0 \le S - i \Leftrightarrow i \le S$

$S - i \le m_2 \Leftrightarrow S - m_2 \le i$

$0 \le k_2 - S + i \Leftrightarrow S - k_2 \le i$

$k_2 - S + i \le n_2 - m_2 \Leftrightarrow i \le n_2 + S - m_2 - k_2$

$$\begin{cases} 0 \le i \le m_1 \\ k_1 + m_1 - n_1 \le i \le k_1 \\ S - m_2 \le i \le S \\ S - k_2 \le i \le n_2 + S - m_2 - k_2 \end{cases}$$

$$z_1 := \max(0,\ k_1 + m_1 - n_1,\ S - m_2,\ S - k_2)$$

$$z_2 := \min(m_1,\ k_1,\ S,\ n_2 + S - m_2 - k_2)$$

$$z_1 \le i \le z_2$$

$$p = \sum_{i=z_1}^{z_2} C_{m_1}^{i} C_{n_1 - m_1}^{k_1 - i} C_{m_2}^{S-i} C_{n_2 - m_2}^{k_2 - S + i} \left(C_{n_1}^{k_1} C_{n_2}^{k_2} \right)^{-1}$$

$$z_1 = \max(0,\ 2+5-8,\ 3-5,\ 3-4) = \max(0, -1, -2, -1) = 0$$

$$z_2 = \min(5,\ 2,\ 3,\ 12+3-5-4) = \min(5, 2, 3, 6) = 2$$

$$C_{m_1}^{i} C_{n_1 - m_1}^{k_1 - i} C_{m_2}^{S-i} C_{n_2 - m_2}^{k_2 - S + i} = C_5^{i} C_{8-5}^{2-i} C_5^{3-i} C_{12-5}^{4-3+i} =$$

$$= C_5^{i} C_3^{2-i} C_5^{3-i} C_8^{i+1}$$

$$C_{n_1}^{k_1} C_{n_2}^{k_2} = C_8^{2} C_{12}^{3}$$

$$p = \sum_{i=0}^{2} C_5^{i} C_3^{2-i} C_5^{3-i} C_8^{i+1} \left(C_8^{2} C_{12}^{3} \right)^{-1}.$$

Ответ:

$$z_1 = \max(0,\ k_1 + m_1 - n_1,\ S - m_2,\ S - k_2)$$
$$z_2 = \min(m_1,\ k_1,\ S,\ n_2 + S - m_2 - k_2)$$
$$p = \sum_{i=z_1}^{z_2} C_{m_1}^{i} C_{n_1 - m_1}^{k_1 - i} C_{m_2}^{S-i} C_{n_2 - m_2}^{k_2 - S + i} \left(C_{n_1}^{k_1} C_{n_2}^{k_2} \right)^{-1}$$

$$p = \sum_{i=0}^{2} C_5^{i} C_3^{2-i} C_5^{3-i} C_8^{i+1} \left(C_8^{2} C_{12}^{3} \right)^{-1}$$