1. $(1,1,1,1),(2,1,1,1),(2,2,1,1),\ldots,(n,n,n,n)$

↳ broj multiskupova sastavljenih od elemenata

$1,2,\ldots,n \to (x,y,z,w) \quad x \le y \le z \le w \le n$

$$\binom{4+n-1}{4} = \binom{n+3}{4}$$

2. $\binom{12}{3}\cdot\binom{9}{3}\cdot\binom{6}{3}\cdot\binom{3}{3}$

3. $3 \cdot \binom{4}{0,0,4}\cdot 2^4 = \binom{4}{4,0,0}\cdot 2^4 + \binom{4}{0,4,0}\cdot 2^4 + \binom{4}{0,0,4}\cdot 2^4$

$\vdots$

$$6\cdot\binom{4}{0,1,3}\cdot 2^4 = \binom{4}{0,1,3}2^0 2^1\cdot 2^3 + \binom{4}{1,0,3}\cdot 2^1 2^0 2^3 +$$
$$+\binom{4}{1,3,0}\cdot 2^1 2^3 2^0 + \binom{4}{0,3,1}\cdot 2^0 2^3 2^1 +$$
$$+\binom{4}{3,0,1}\cdot 2^3 2^0 2^1 + \binom{4}{3,1,0}\cdot 2^3\cdot 2^1\cdot 2^0$$

$\vdots$

$$= \sum_{\substack{i+j+k=n \\ 0\le i,j,k\le n}} \binom{4}{i,j,k} 2^i 2^j 2^k = (2+2+2)^4 = 8^4$$

4. $a_n = 5a_{n-1} + 2 \qquad a_0 = 2 \qquad n \ge 1$

$a_n z^n = 5a_{n-1}z^n + 2z^n$

$$\sum_{n\ge 1} a_n z^n = 5\sum_{n\ge 1} a_{n-1} z \cdot z^{n-1} + 2\sum_{n\ge 1} z^n$$

$$\sum_{u\geq 0} a_u z^u - a_0 z^0 = 5z\sum_{u\geq 0} a_u z^u + 2\cdot\frac{1}{1-z} - 2$$

$$\underbrace{\sum_{u\geq 0} a_u z^u}_{A(u)} - \cancel{2} = \underbrace{5z\sum_{u\geq 0} a_u\cdot z^u}_{5z\,A(u)} + \frac{2}{1-z} - \cancel{2}$$

$$(1-5z)\,A(u) = \frac{2}{1-z} \qquad A(u)\,\frac{2}{(1-5z)(1-z)} =$$

$$= 2(1-5z)^{-1}(1-z)^{-1}$$

$$\binom{-1}{k} = \frac{(-1)(-2)\cdots(-1-k+1)}{k!} = \frac{(-1)^k\,1\cdot 2\cdot\ldots\cdot k}{k!} = (-1)^k$$

$$A(u) = 2\sum_{u\geq 0}(-1)^n(-5z)^n\sum_{m\geq 0}(-1)^n\cdot(-z)^n =$$

$$= 2\sum_{u\geq 0}5^n\cdot z^n\cdot\sum_{m\geq 0}z^n =$$

$$= 2\sum_{u\geq 0}z^u\left(\sum_{i=0}^{u}5^n\cdot 1\right) =$$

$$= 2\sum_{m\geq 0}z^u\cdot\left(\sum_{i=1}^{u}5^n + 5^0\right) =$$

$$= 2\sum_{u\geq 0}z^u\cdot\left(5\cdot\frac{5^n-1}{5-1} + \frac{4}{4}\right) =$$

$$= \frac{1}{2}\sum_{u\geq 0}z^u\cdot(5^{n+1}-1) =$$

$$\Rightarrow a_n = \frac{1}{2}(5^{n+1}-1)$$

5. $1 \underbrace{\_\ \_\ \ldots\ \_}^{n-1} \Rightarrow a_{n-1}$

$2 \underbrace{\_\ \ldots\ \_}^{n-2} \Rightarrow a_{n-2}$

$3 \underbrace{\ldots\ \_}^{n-3} \Rightarrow a_{n-3}$

$$\left.\right\} a_n = a_{n-1} + a_{n-2} + a_{n-3}$$

$a_1 = 1$

$a_2 = 3$

$a_3 = 4$

6. n zeka m korpica, $n \geq m$

$\Rightarrow$ UDP $\quad n = k \cdot m + r$

$\hookrightarrow r \geq 0$

$\downarrow$

makar $k = \lceil \frac{n}{m} \rceil + 1$ u jednoj korpi