

$$f(n) = \left| \left\{ (a_1, \dots, a_4) : a_2 = 2a_1, a_1 + \dots + a_4 = n \right\} \right| \quad . \text{K 1}$$

$$= \left| \left\{ (b_1, b_2, b_3) : 3b_1 + b_2 + b_3 = n \right\} \right|$$

1) $\sum_{n=0}^{\infty} f(n)x^n \sim \frac{1}{(1-x)^3} \cdot \frac{1}{1-x} \cdot \frac{1}{1-x}$

$$(1+x^3+x^6+\dots)(1+x+x^2+\dots)(1+x+x^2+\dots) \sim \frac{1}{1-x^3} \cdot \frac{1}{1-x} \cdot \frac{1}{1-x}$$

$$\sum_{n=0}^{\infty} f(n)x^n = \frac{1}{1-x^3} \cdot \frac{1}{(1-x)^2} \quad | \circ \text{f}$$

$$0 \leq b_1 \leq \left[\frac{n}{3} \right] \quad | \text{N} \text{A} \text{A} \quad . \text{A}$$

$$\left| \left\{ (b_2, b_3) : 3b_1 + b_2 + b_3 = n \right\} \right| = n - 3b_1 + 1$$

$$f(n) = \sum_{i=0}^{\left[\frac{n}{3} \right]} (n - 3i + 1) = \sum_{i=0}^{\left[\frac{n}{3} \right]} (n+1) - 3 \sum_{i=0}^{\left[\frac{n}{3} \right]} i \quad | \circ \text{f}$$

$$= \left(\left[\frac{n}{3} \right] + 1 \right) (n+1) - \frac{3}{2} \left(\left[\frac{n}{3} \right] + 1 \right) \left[\frac{n}{3} \right] = \left(n - \frac{3}{2} \left[\frac{n}{3} \right] + 1 \right) \left(\left[\frac{n}{3} \right] + 1 \right)$$

$$g(n) = \left| \left\{ (A_1, A_2, A_3, A_4) : \begin{array}{l} \text{In } X \text{ is } 1 \text{ part } (A_1, \dots, A_4) \\ |A_2| = 2|A_1| \end{array} \right\} \right| \quad . \text{E}$$

$$= \sum_{i=0}^{\left[\frac{n}{3} \right]} \sum_{j+k=n-3i} \binom{n}{i; 2i; j; k} = \sum_{i=0}^{\left[\frac{n}{3} \right]} \binom{n}{i; 2i; n-3i} \sum_{j+k=n-3i} \binom{n-3i}{j}$$

$$= \sum_{i=0}^{\left[\frac{n}{3} \right]} \binom{n}{i; 2i; n-3i} \cdot 2^{n-3i}$$

AB

islic, T -> p(Y) is odd n & L -> |noj, k. 2

$$2(n-1) = \sum_{i=1}^n \deg(i) = \sum_{i=1}^3 \deg(i) + \sum_{i=4}^n \deg(i) \geq 12 + L + 2(n-3-L)$$

$$= 6 + 2n - L$$

$$\therefore L \geq 8 \quad \boxed{p^{\frac{1}{2}}}$$

G_1, \dots, G_r 121 nbs N3p p V_{1, ..., r} V_r 121 .

$$\therefore V = \bigcup_{i=1}^r V_i \quad \text{121} \quad \text{N1C121} \quad V_{1, \dots, r} \text{ or } p^{\frac{1}{2}}$$

(*) G_1, \dots, G_r nlc p(F(N)) V F(Y) p(Y) is odd \Rightarrow UK

$$\therefore |V_1| \dots |V_r| \cdot n^{r-2} \quad (*)$$

{1,2} Y{3} nlc p(F(N)) p(Y) on : (*) 121

$$Y{3} nlc p(F(N)) p(Y) on \cdot 2 \cdot n^{n-3} \quad 121$$

$$Y{3} nlc p(F(N)) p(Y) on \cdot 2 \cdot n^{n-3} \quad 121 \quad \{3,4\}$$

$$\cdot 2 \cdot 2 \cdot n^{n-4} \quad 121 \quad \{1,2\}, \{3,4\} \quad \text{N1Y{3}}$$

$$N1Y{3} nlc f_k p(F(N)) N1K0 p(Y) on \quad 121$$

$$\quad 121 \quad \{3,4\}, \{1,2\}$$

$$n^{n-2} - (2 \cdot n^{n-3} + 2 \cdot n^{n-3} - 4 \cdot n^{n-4})$$

$$= n^{n-2} - 4n^{n-3} + 4n^{n-4}$$

$$A_i = \{(r(i), \tau(i)) \in S_n \times S_n : (r(i), \tau(i)) = (i, i)\} \quad \rightarrow |I^0| \quad .2.3$$

$$(pf) \quad \left| \bigcap_{i \in I} A_i \right| = (n - |I|)!^2 \quad 156$$

$$(pf) \quad \left| \bigcup_{i=1}^n A_i \right| = \sum_{k=1}^n (-1)^{k+1} \binom{n}{k} (n-k)!^2$$

$$\left| S_n \times S_n \setminus \bigcup_{i=1}^n A_i \right| = \sum_{k=0}^n (-1)^k \binom{n}{k} (n-k)!^2$$

$$\infty > N \quad \text{3N} \quad \text{GebN} \quad \text{id} \quad . \quad N = R(\overbrace{10, \dots, 10}^q) \quad 161 \quad .2.4$$

$$\cdot a_{ij} \in \{0, 1, 2\} \quad \text{id} \quad \text{id} \quad \text{id} \quad A = (a_{ij})_{i,j=1}^n \quad \text{id} \quad n \geq N \quad 161$$

! δ k_m $\rho(k)$ $\rho(k)$ $n \in \{3, 4, 5, 6, 7, 8, 9\}$

$$\cdot i, j \quad \{1, i\} \quad \{i\}, j \quad \text{id} \quad c(i, j) = (a_{ij}, a_{ji})$$

$$\cdot p \quad \text{id} \quad 3 \cdot 3 = 9 \rightarrow k_n \quad \text{id} \quad \text{id} \quad \text{id} \quad \text{id} \quad 161$$

$$\text{id} \quad \text{id} \quad 1 \leq k_1 < \dots < k_{10} \leq n \quad \rho^{(N)} \quad \rho \quad \rho$$

$$\cdot \text{id} \quad 1 \leq k_j \leq 10 \quad \rho \quad \text{id} \quad \text{id} \quad , \quad 1 \leq i \neq j \leq 10 \quad \text{id} \quad c(k_i, k_j) = (\alpha, \beta)$$

$$\cdot \text{id} \quad b_{ji} = a_{kjki} = \beta \quad , \quad b_{ij} = a_{k_ik_j} = \alpha$$

5. $v = e + f - 2$: Δ $|NO|$. t e , f

$$(1) \quad v - e + f = 2 \quad : \text{f} \text{lik} \text{ vnoi} . \text{ skc}$$

$$(2) \quad 2e = 4v \quad : 4 \text{ ip3} \text{ b} \text{ n673}$$

$$(3) \quad f = t + 30 + 12 = t + 42 \quad : \text{lik} \text{ n7jN}$$

: $t \in \text{lik} \text{ n7jN}$

$$(4) \quad 2e = 3 \cdot t + 4 \cdot 30 + 5 \cdot 12 = 3t + 180$$

yp1 (3), (2), (1) - N

$$t + 42 = f = 2 + e - v = 2 + e - \frac{e}{2} = 2 + \frac{e}{2}$$

$$4t + 168 = 8 + 2e$$

$$3t + 180 \stackrel{(4)}{=} 2e = 4t + 160 \Rightarrow t = 20$$

$$\boxed{e = 120, v = 60}$$

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