Subject: Problem Set 6 (9)

Year: Month: Date:

Problem 1

(a) group $\overset{2}{\wedge}$ consecutive numbers.

$\underbrace{n+1}_{\text{numbers}} \xrightarrow{\text{Choosing}} \underbrace{n}_{\text{groups}}$

(b) $\underbrace{\text{vertices}}_{n} \xrightarrow{\deg(v)} \underbrace{\{1 \dots n-1\}}_{n-1}$ degrees

Problem 2

$$|S_{All}| - |S_{18062}| - |S_{6042}| - |S_{35876}| + |S_{1\dots} \cap S_{6\dots}| + |S_{6\dots} \cap S_{3\dots}| + |S_1 \cap S_3| - 3|S_1 \cap S_2 \cap S_6| =$$

$$9! - 6! - 7! - 6! + 0 + 3! + 0 - 0 \#$$

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Problem 3

(a) $13 \cdot \binom{4}{2} \cdot 4^3 \cdot \binom{12}{3}$

(b) $\binom{n+k-1}{k}$

(c) We add an extra variable x_{k+1}. And then ignore it in the original sum. $\binom{n+k+1}{k+1}$

(d) $2^{\binom{n}{2}}$

(e) 2^{n^2}

(f) $2^{\binom{n}{2}}$

(g) We map it to a totally ordered set. $n!$

(h) $|S_2|+|S_5|+|S_7|-|S_2 \cap S_5|-|S_2 \cap S_7|-|S_5 \cap S_7|$
$+3|S_2 \cap S_5 \cap S_7| = \frac{700}{2}+\frac{700}{5}+\frac{700}{7}-\frac{700}{2 \cdot 5}$
$-\frac{700}{2 \cdot 7}-\frac{700}{5 \cdot 7}+3\frac{700}{2 \cdot 5 \cdot 7}$

(i) $\binom{n+k-1}{k-1} \cdot n!$

(j) $k!\binom{n}{k}(n-k)!\binom{n-k+k-1}{k-1}$

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Problem 4

(Place of $*$, $\{0,1\}^{n-1}$) $\longrightarrow n 2^{n-1}$

(Place of k nonzero digits, Place of $*$)

$\longrightarrow \sum_{k=1}^{n} \binom{n}{k} k$

Problem 5

n is odd $\longrightarrow \binom{2n}{n}$ has unequal number of reps.

$\longrightarrow \frac{1}{2}\binom{2n}{n}$ have more dems.

n is even $\longrightarrow \binom{2n}{n} - \binom{n}{n/2}\binom{n}{n/2}$ // // // reps.

$\longrightarrow \frac{1}{2}\left(\binom{2n}{n} - \binom{n}{n/2}\binom{n}{n/2}\right)$