n = 4

i	j
1	2
1	3
1	4
2	3
2	4
3	4

3 (1, 1, 1) — 2 (2, 2) — 1 (3)

#6

n = 5

i	j
1	2
1	3
1	4
1	5
2	3
2	4
2	5
3	4
3	5
4	5

4 (1, 1, 1, 1) — 3 (2, 2, 2) — 2 (3, 3) — 1 (4)

= 10

$n = 4$

i	j
1	2
1	3
1	4
2	3
2	4
3	4

Rewrite as (i, j)

S_1: $(1,2)$, $(1,3)$, $(1,4)$

S_2: $(2,3)$, $(2,4)$

S_3: $(3,4)$

Let

S_t = all (i, j) with $i = t$

$S = S_1 \cup S_2 \cup S_3$

$|S| = |S_1| + |S_2| + |S_3|$

$3 \quad 2 \quad 1$

$= 6$

$S_1 = \{a, b, c\}$ $|S_1| = 3$

$S_2 = \{d, e, f\}$ $|S_2| = 3$

$S_3 = \{a, f, g, h\}$ $|S_3| = 4$

$S_4 = \{g, h\}$ $|S_4| = 2$

$S = \{a, b, c, d, e, f, g, h\}$

$= S_1 \cup S_2 \cup S_3$

$= S_1 \cup S_2 \cup S_4$

$|S| = 8$

$= |S_1| + |S_2| + |S_4| = 8$
$\quad\ 3 \quad\ 3 \quad\ 2$

$\neq |S_1| + |S_2| + |S_3|$
$\quad\ 3 + 3 + 4 = 10$

$n = 5$

2 element subsets	ordered pairs
$\{1, 2\}$	$(1,2), (2,1)$
$\{1, 3\}$	$(1,3), (3,1)$
$\{1, 4\}$	$(1,4), (4,1)$
$\{1, 5\}$	$(1,5), (5,1)$
$\{2, 3\}$	$(2,3), (3,2)$
$\{2, 4\}$	$(2,4), (4,2)$
$\{2, 5\}$	$(2,5), (5,2)$
$\{3, 4\}$	$(3,4), (4,3)$
$\{3, 5\}$	$(3,5), (5,3)$
$\{4, 5\}$	$(4,5), (5,4)$

ordered pairs $= 5 \cdot 4 = \boxed{20}$

Then

2-element subsets

$$= \frac{20}{2} = \boxed{10}$$

2-element lists
from 3-element sets
{a, b, c}

L_1	L_2
a	a
a	b
a	c
b	a
b	b
b	c
c	a
c	b
c	c

functions
$f: \{1, 2\} \to \{a, b, c\}$

f(1) = a	f(2) = a
f(1) = a	f(2) = b
f(1) = a	f(2) = c
f(1) = b	f(2) = a
f(1) = b	f(2) = b
f(1) = b	f(2) = c
f(1) = c	f(2) = a
f(1) = c	f(2) = b
f(1) = c	f(2) = c

= 3 × 3 = 9

L_1 L_2

3 pos 3 pos

functions

$f: \{1, 2, 3\} \to \{a, b\}$

same as 3-element lists from $\{a, b\}$

a a a
a a b
a b a
a b b
b a a
b a b
b b a
b b b

$L_1\ L_2\ L_3$

$2 \times 2 \times 2 = 8$