Name:

Section 6.2

Assume there is a club with 7 girls and 8 boys.

1. In how many ways can the members line up for a photograph?

$15!$

We're ordering all students

2. In how many ways can a President, Vice-President, Secretary and Treasurer be elected assume no one holds more than one position?

$P(15,4) = 15 \cdot 14 \cdot 13 \cdot 12$

From the 15 students, we order 4 of them.

$\overline{P}$ $\overline{VP}$ $\overline{S}$ $\overline{T}$

15 ways to choose P
14 ways for VP
13 for S, 12 for T.

3. In how many ways can P, VP, S and T be elected such that girl 1 is P or boy 1 is VP?

Inclusion-exclusion.
A = elections where g_1 is P
B = elections where b_1 is VP
We want
$|A \cup B| = |A| + |B| - |A \cap B| =$ → $= P(14,3) + P(14,3) - P(13,2)$

4. In how many ways can the club form a committee of 5 people?

$C(15,5) = \frac{P(15,5)}{5!} = \frac{15!}{5!10!}$

5. In how many ways can the club form a committee of 2 girls and 2 boys?

$$C(7,2)\cdot C(8,2) = \frac{7!}{2!5!}\cdot\frac{8!}{2!6!}$$

6. In how many ways can the club from a committee of 4 people that contains at least one boy?

total number of comittees $= C(15,4)$

committees all girls $= C(7,4)$

with at least one boy $= C(15,4) - C(7,4)$

7. In how many ways can the club from a committee of 4 people that contains at most one boy?

1 boy: $C(7,3)\cdot 8$

all girls: $C(7,4)$

at most one boy $= C(7,4) + C(7,3)\cdot 8$

8. In how many ways can the club form a committee of 4 people that contains at least one boy and at least one girl?

bad committees

all girl: $C(7,4)$

all boy: $C(8,4)$

ANS: $C(15,4) - C(7,4) - C(8,4)$

9. In how many ways can the club form a committee of 4 people such that boy 1 and boy 2 do not have to serve together?

boy1 groups: $C(13,3)$ + boy2 groups: $C(13,3)$ + neither boy 1 or boy 2: $C(13,4)$