CW 05A Solutions

1. ≤ 3 cookies each $\Rightarrow \leq 225$ cookies

So, ≥ 226 cookies

$\Rightarrow$ at least one person has ≥ 4 cookies

2. $C(20,8) \cdot P(8,3) = \frac{20!}{8!\,12!} \frac{8!}{5!} = \frac{20!}{12!\,5!}$

or

$P(20,3) \cdot C(17,5) = \frac{20!}{17!} \frac{17!}{5!\,12!} = \frac{20!}{5!\,12!}$

3. $C(9,4) = \frac{9!}{4!\,5!}$

4. (a) $C(20,4) \cdot C(25,4) = \frac{20!}{4!\,16!} \cdot \frac{25!}{4!\,21!}$

(b) $\binom{20}{3}\binom{25}{5} + \binom{20}{4}\binom{25}{4} + \binom{20}{5}\binom{25}{3}$

$= \frac{20!}{3!\,17!} \cdot \frac{25!}{5!\,20!} + \frac{20!}{4!\,16!} \cdot \frac{25!}{4!\,21!} + \frac{20!}{5!\,15!} \cdot \frac{25!}{3!\,22!}$

CW 05B Solutions

1. ≤ 4 cookies each $\Rightarrow \leq 340$ cookies

So, ≥ 341 cookies

$\Rightarrow$ at least one person has ≥ 5 cookies

2. $C(25,7) \cdot P(7,3) = \frac{25!}{7!\,18!} \frac{7!}{4!} = \frac{25!}{18!\,4!}$

or

$P(25,3) \cdot C(22,4) = \frac{25!}{22!} \frac{22!}{4!\,18!} = \frac{25!}{4!\,18!}$

3. $C(9,5) = \frac{9!}{4!\,5!}$

4. (a) $C(24,4) \cdot C(30,4) = \frac{24!}{4!\,20!} \cdot \frac{30!}{4!\,26!}$

(b) $\binom{24}{3}\binom{30}{5} + \binom{24}{4}\binom{30}{4} + \binom{24}{5}\binom{30}{3}$

$= \frac{24!}{3!\,21!} \cdot \frac{30!}{5!\,25!} + \frac{24!}{4!\,20!} \cdot \frac{30!}{4!\,26!} + \frac{24!}{5!\,19!} \cdot \frac{30!}{3!\,27!}$