Exercise 1

Question: Each user on a computer system has a password, which is six to eight characters long, where each character is an uppercase letter or a digit. Each password must contain at least one digit. How many possible passwords are there?

- We solved this before. We found: $\sum_{n=6}^{8} 36^n - 26^n$

- P_6 = #passwords with 1 digit + #passwords with 2 digits + … + #passwords with 6 digits
- $P_6 = \binom{6}{1}10 \cdot 26^5 + \binom{6}{2}10^2 \cdot 26^4 + \binom{6}{3}10^3 \cdot 26^3 + \cdots + \binom{6}{6}10^6$
- $P_6 = \sum_{k=1}^{6} \binom{6}{k}\mathbf{10}^k \cdot \mathbf{26}^{6-k}$
- $P_6 + P_7 + P_8 = \sum_{n=6}^{8}\sum_{k=1}^{n} \binom{n}{k}\mathbf{10}^k \cdot \mathbf{26}^{n-k}$

Exercise 2

Question: There are five people.

1. How many ways to photograph them in groups of three?
   - Solve using permutations: **P(5,3)** $= 5 \cdot 4 \cdot 3 =$ **60**
   - Solve using combinations: **C(5,3) · 3!** $= 5 \cdot 4 \cdot 3 =$ **60**
2. Suppose out of these 5 people, there is one person must be in each picture?
   - Solve using permutations: **P(4,2) · 3** $= 4 \cdot 3 \cdot 3 =$ **36**
   - Solve using combinations: **C(4,2) · 3!** $= 4 \cdot 3 \cdot 3 =$ **36**