
Application of

Combinatorics & Probability

**in BANK
Industry**

Use Case #1:

A bank wants to arrange 4 VIP customers in different orders for a premium service

Order is important?

YES

Repetition is allowed?

NO

All Selection?

YES

Subset Selection?

NO

$$n = 4$$

$$P = n!$$

$$P = 4! \rightarrow 4 \times 3 \times 2 \times 1 \rightarrow 24$$

Use Case #2:

The bank selects 3 customers from a total of 10 for a promotion, and the order matters.

Order is important?

YES

Repetition is allowed?

NO

All Selection?

NO

Subset Selection?

YES

$$n=10, \quad k=3$$

$$V(n, k) = \frac{n!}{(n-k)!}$$

$$V(10, 3) = \frac{10!}{(10-3)!} = \frac{10 \times 9 \times 8 \times 7!}{7!} = 720$$

Use Case #3:

The bank generates 4-digit ATM PIN codes using the digits 0-9 (10 options)

Order is important?

YES

Repetition is allowed?

YES

All Selection?

NO

Subset Selection?

YES

$$n = 10, \quad k = 4$$

$$V \sim (n, k) = n^k$$

$$V \sim (10, 4) = 10^4 = 10,000$$

Use Case #4:

The bank selects 3 customers out of 10 for a joint loan, but the order does not matter

Order is important?

NO

Repetition is allowed?

NO

All Selection?

NO

Subset Selection?

YES

$$n = 10, \quad k = 3$$

$$C(n, k) = \frac{n!}{k! (n - k)!}$$

$$C(n, k) = \frac{10!}{3! (10 - 3)!} = \frac{10 \times 9 \times 8 \times 7!}{3! \times 7!} = 120$$

Use Case #5:

A customer can hold 2 account types from a total of 3 types (Savings, Current, Business)

Order is important?

NO

Repetition is allowed?

YES

All Selection?

NO

Subset Selection?

YES

$$n=3, \quad k=2$$

$$C^{\sim}(n, k) = \frac{(n+k-1)!}{k!(n-1)!}$$

$$C^{\sim}(3, 2) = \frac{(3+2-1)!}{2!(3-1)!} = \frac{4!}{2! \times 2!} = 6$$