The Factorial Function

You may be familiar with the notation *n!*, pronounced "n factorial", the product of all of the positive integers less-than, or equal to *n*. In mathematical notation it is written like this.

$$\begin{aligned} n! &= \prod_{k=1}^{n} k \\ &= 1 \cdot 2 \cdot 3 \cdots (n-2) \cdot (n-1) \cdot n \\ &= n(n-1)(n-2) \cdots (2)(1) \end{aligned}$$

Using **a loop**, we can implement the function in C++ like this:

```
int factorial(n)
{
    int result = 1;
    for (int i = 1; i <= n; ++i) { result *= i; }
    return result;
}
```

Algorithms that use loops like this are **iterative**. Let's see how to write the function **recursively**.