

BASIC CONCEPT OF RECURSION (p106)

BREAK A PROBLEM INTO SMALLER VERSIONS OF THE SAME PROBLEM

$$n! = \prod_{i=1}^n i \quad (n! = 1 * 2 * 3 * \dots * n)$$

$$n! = n(n-1)!$$

RECURSION MUST STOP AT SOME POINT - THIS IS THE "BASE CASE"

THE KEY TO RECURSION IS THE CALL STACK

RECURSIVE HELPER FUNCTIONS CAN BE USED TO ACCUMULATE RESULTS.

```
fact(n)
{
    if (n==0) return 1;

    return n * fact(n-1);
}
```

↖ MUST BE DONE AFTER CALL TO fact(n-1) RETURNS

```
fact(n, result)
{
    if (n==0) return result;
    return fact(n-1, n * result);
}
```

↖ NO NEED TO STORE ANYTHING!

```
fact(n)
{
    return fact(n, 1);
}
```

USE TAIL-RECURSIVE CALLS WHEN POSSIBLE.

ITERATIVE METHODS ↔ RECURSIVE METHODS

FASTER

SIMPLER

ELEGANT

EASIER TO DEVELOP & UNDERSTAND

A GIVEN PROBLEM USUALLY LEANS ITSELF TO ONE APPROACH OVER THE OTHER.