

Chapter 6 - Recursive Functions

→ Expressions are evaluated by a stepwise process

Ex: $\text{fac } 4$

$$= \text{product } [1..4]$$

$$= \text{product } [1, 2, 3, 4]$$

$$= 1 * 2 * 3 * 4$$

$$= 24$$

→ Functions which are defined in terms of itself are recursive functions

Ex: $\text{fac } 0 = 1$ → Base case

$\text{fac } n = n * \text{fac } (n-1)$ → Recursive case

→ Recursion on lists; can also be used to define functions on lists

Ex: $\text{product} :: \text{Num } a \Rightarrow [a] \rightarrow a$

$$\text{product } [] = 1$$

$$\text{product } (n:ns) = n * \text{product } ns$$

$$\text{product } [2, 3, 4]$$

$$= 2 * \text{product } [3, 4]$$

$$= 2 * (3 * (\text{product } [4]))$$

$$= 2 * (3 * (4 * 1))$$

$$= 24$$

→ Functions with more than one argument can also be defined using recursion