

**Exercise 1: (Recursion & Iteration)**

Let  $n \in \mathbb{N}_0$ . The double factorial function is given by

$$n!! := \begin{cases} n \cdot (n-2)!!, & n \in \mathbb{N} \setminus \{1\} \\ 1, & n \in \{0, 1\}. \end{cases}$$

Program the double factorial function

- (1) recursively without Remember-Effect.
- (2) recursively without Remember-Effect.
- (3) iteratively with Fold.
- (4) with Apply and Times.

**(10 points)**

**Exercise 2: (Binomial Coefficients)**

Write an efficient procedure which determines the binomial coefficients  $\binom{n}{k}$  for  $n, k \in \mathbb{N}_0$  from the Pascal's well-known triangle.

Test your procedure on the number  $\binom{1000}{500}$  and compare your result with the command Binomial. **(6 points)**