

## Exercises

E17.19 [1DG]5 Let  $n \geq 1$  be an integer. Let  $I$  be an open interval and  $x_0 \in I$ , let  $f, g : I \rightarrow \mathbb{R}$  be functions  $n - 1$  times differentiable in the interval, and whose  $(n - 1)$ -th derivative is differentiable in  $x_0$ .

Show that the product  $fg$  is differentiable  $n - 1$  times in the interval, and its  $(n - 1)$ -th derivative is differentiable in  $x_0$ . Write an explicit formula for the  $n$ -th derivative  $(fg)^{(n)}$  in  $x_0$  of the product of the two functions, (formula that uses derivatives of only  $f$  and only  $g$ ).

*(If you don't find it, look in Wikipedia at the General Leibniz rule [?]).*

**Solution 1.** [1DH]