Definition 23.27. [23Z] *We formally indicate with D the operation* "computing of the derivative". *Given a polynomial* $p(x)$

$$p(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$$

(which has constants coefficients $a_i \in \mathbb{C}$*) we formally construct the linear operator*

$$p(D) = a_n D^n + a_{n-1} D^{n-1} + \ldots a_1 D + a_0$$

which transforms a function $f : \mathbb{R} \to \mathbb{C}$ *of class* C^{n+k} *into the function* $p(D)f$*, class at least* C^k*, defined pointwise by*

$$[p(D)f](x) \stackrel{def}{=} a_n f^{(n)}(x) + a_{n-1} f^{(n-1)}(x) + \ldots a_1 f'(x) + a_0 f(x) \quad .$$