Show that the *general formula* is

$$D_x^n w = \sum_{0 \le j \le n} \sum_{\substack{k_1+k_2+\cdots+k_n=j \\ k_1+2k_2+\cdots+nk_n=n \\ k_1,k_2,\ldots,k_n \ge 0}} D_u^j w \frac{n!(D_x^1 u)^{k_1} \cdots (D_x^n u)^{k_n}}{k_1!(1!)^{k_1} \cdots k_n!(n!)^{k_n}} \tag{1}$$