Note

Here we have used the fact that

$$(aD+b)(cD+d) = acD^2 + (ad+bc)D + bd$$

if a, b, c, d are constants. This is not true unless a, b, c, d are constants.

For example,

$$(D+t)f = f' + tf$$

$$D(D+t)f = D(f'+tf) = f'' + tf' + f$$

$$= (D^2 + tD + 1)f.$$

So $\quad D(D+t) = D^2 + tD + 1$

& $\quad D(D+t) \neq D^2 + tD.$