So $P_n(x)$ can be written as

(★) $P_n(x) = f[x_0] + f[x_0, x_1](x-x_0) + f[x_0, x_1, x_2](x-x_0)(x-x_1) + \ldots$
$+ f[x_0, x_1, \ldots, x_n](x-x_0)\ldots(x-x_{n-1})$

Def: This formula is called <u>Newton's interpolatory (forward) divided-difference formula</u>.

Ex 1: #4/p.131 (a) Construct the interpolating polynomial of degree 4 for the points in the table

x	$f(x)$	Ist DD	IInd DD	IIIrd DD	IVth DD
0.0	-6.000000				
		1.0517			
0.1	-5.89483		0.5725		
		1.22345		0.215	
0.3	-5.65014		0.7015		0.06
		1.5742		0.278	
0.6	-5.17788		≈0.9517		
		2.2404		0.356625	0.0786
1.0	-4.28172		1.237		
		2.8589			
1.1	-3.99583				

$P_4(x) = -6 + 1.0517x + 0.5725x(x-0.1) + 0.215x(x-0.1)(x-0.3)$
$+ 0.063x(x-0.1)(x-0.3)(x-0.6)$

(b) Add $f(1.1) = -3.99583$ to the table, and construct the interpolating polynomial of degree 5

The Vth DD is $\begin{matrix} 0.063 \\ 0.078625 \end{matrix} \searrow \approx 0.0142$

$P_5(x) = P_4(x) + 0.0142x(x-0.1)(x-0.3)(x-0.6)(x-1)$