

Ex: Find $P(x)$ of degree 3 such that

$$P(x_0) = f_0 \quad P(x_1) = f_1 \quad P(x_2) = f_2$$

$$P'(x_1) = f_1'$$

Assume $x_0 < x_1 < x_2$,

We use the points x_0, x_1, x_1, x_2

x	f	<u>I</u> st DD	<u>II</u> nd DD	<u>III</u> rd DD.
x_0	f_0			
x_1	f_1	$f[x_0, x_1]$		
x_1	f_1	$f'(x_1)$	$f[x_0, x_1, x_1]$	
x_2	f_2	$f[x_1, x_2]$	$f[x_1, x_1, x_2]$	$f[x_0, x_1, x_1, x_2]$

where

$$f[x_0, x_1, x_1] = \frac{f'(x_1) - f[x_0, x_1]}{x_1 - x_0}$$

$$f[x_1, x_1, x_2] = \frac{f[x_1, x_2] - f'(x_1)}{x_2 - x_1}$$

$$P(x) = f_0 + f[x_0, x_1](x-x_0) + f[x_0, x_1, x_1](x-x_0)(x-x_1) + f[x_0, x_1, x_1, x_2](x-x_0)(x-x_1)^2$$