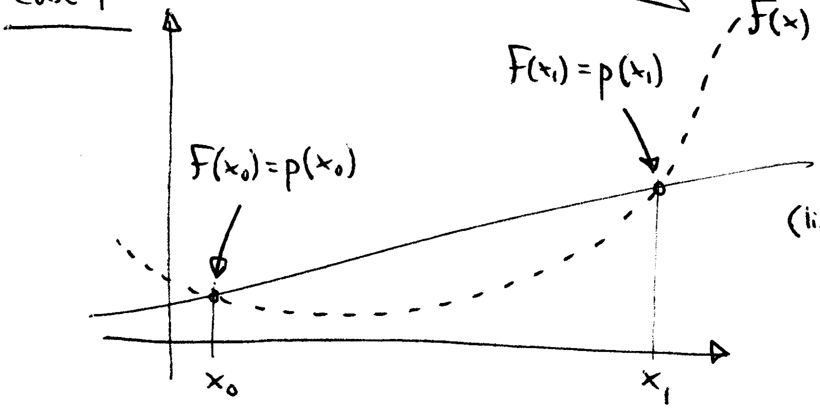
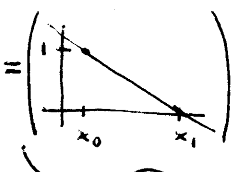
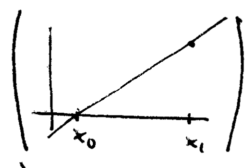
Constructing the interpolating polynomials:

Various methods exist for doing this; the methods below should make sense to you.

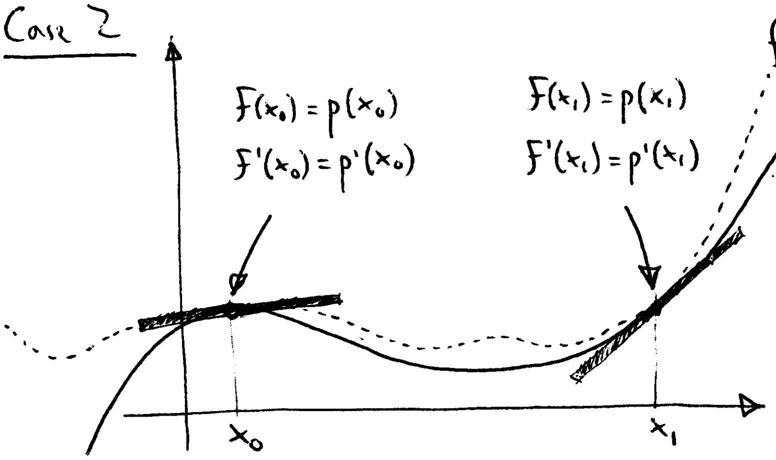
Case 1

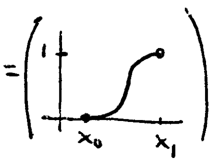
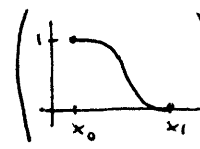


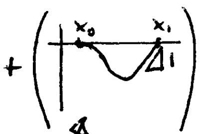
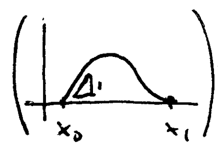
$p(x)$ (linear) $=$  $\cdot f(x_0)$ $+$  $\cdot f(x_1)$

$$1-\frac{x-x_0}{x_1-x_0} \qquad\qquad 1+\frac{x-x_1}{x_1-x_0}$$

Case 2

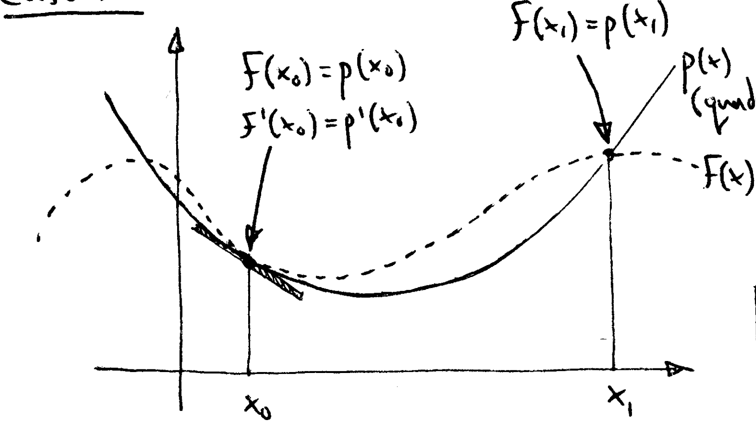


$p(x)$ (cubic) $=$  $\cdot f(x_1)$ $+$  $\cdot f(x_0)$

$+$  $\cdot f'(x_1)$ $+$  $\cdot f'(x_0)$

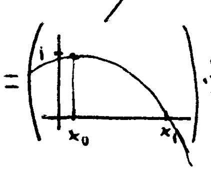
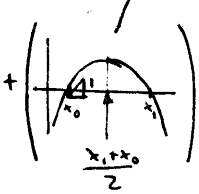
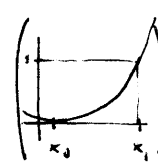
The formulas for these cubic functions are in the course notes. You should be able to derive these on your own.

Case 3



$$1-\left(\frac{x-x_0}{x_1-x_0}\right)^2$$

$$\frac{x_1-x_0}{4}-\frac{1}{x_1-x_0}\left(x-\frac{x_1+x_0}{2}\right)^2$$

$p(x) =$  $\cdot f(x_0)$ $+$  $\cdot f'(x_0)$ $+$  $\cdot f(x_1)$

$$\frac{x_1+x_0}{2}$$

$$\left(\frac{x-x_0}{x_1-x_0}\right)^2$$