

The resulting formulas are usually evaluated at x_0 .

Using a linear IP:

$$\begin{aligned} f'(x_0) &\approx P'[f|x_0, x_1](x_0) = \frac{f(x_1) - f(x_0)}{x_1 - x_0} \\ &= \frac{f(x_0+h) - f(x_0)}{h} \\ &\text{(so-called forward FD)} \end{aligned}$$

$$\begin{aligned} f'(x_0) &\approx P'[f|x_{-1}, x_0](x_0) = \frac{f(x_0) - f(x_{-1})}{x_0 - x_{-1}} \\ &= \frac{f(x_0) - f(x_0-h)}{h} \\ &\text{(so-called backward FD)} \end{aligned}$$

What about approx. to f'' ?