

Reminder - Taylor expansion:

We approximate a smooth (differentiable) f near a point using Taylor series (expansion):

$$f(x) = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \dots$$

$$f(x) = \sum_{n=0}^{\infty} \frac{f^{(n)}(a)(x-a)^n}{n!}$$

, $f^{(n)}(a)$: n th derivative of f evaluated at a

- $f(x) = f(a) + f'(a)(x-a) + \underbrace{O((x-a)^2)}_{\text{represents all the remaining terms}}$

a : current guess, so our approximation:

$f(x) \approx f(a) + f'(a)(x-a)$

 \Rightarrow based on first order Taylor expansion