

Matte 4, Øving 8, Vegard G. Jervell

1) Newtons metode

$$x_{n+1} = g(x_n), \quad g(x_n) = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$g'(x_n) = 1 - \frac{(f'(x_n))^2 - f(x_n)f''(x_n)}{(f'(x_n))^2}$$

$$g'(x_n) = \frac{f(x_n)f''(x_n)}{(f'(x_n))^2}$$

$$x_{n+1} - r = g(x_n) - r = g(x_n) - g(r)$$

Taylorutvikler $g(x_n)$ om r

$$g(x_n) = g(r) + g'(r)(x_n - r) + \frac{g''(r)}{2}(x_n - r)^2 + \dots$$

$$x_{n+1} - r = g'(r)(x_n - r) + \frac{g''(r)}{2}(x_n - r)^2 + \dots$$

$$g'(r) = \frac{f(r)f''(r)}{(f'(r))^2}, \quad f(r) = 0 \vee f'(r) \neq 0 \rightarrow g'(r) = 0$$

$$x_{n+1} - r = \frac{g''(r)}{2}(x_n - r)^2 + \dots$$

kvadratisk konvergens