

$$1a) \quad f(x) = \arctan(x) - x \quad x_0 = 0$$

$$f'(x) = \frac{1}{x^2+1} - 1 \quad f'(0) = 0$$

$$f''(x) = \frac{-2x}{(x^2+1)^2} \quad f''(0) = 0$$

$$f'''(x) = \frac{-2(x^2+1)^2 + 2x \cdot 2(x^2+1) \cdot 2x}{(x^2+1)^4} = \frac{6x^2-2}{(x^2+1)^3}$$

$$f'''(0) \neq 0$$

\Rightarrow 3. Ordnung Nullstelle \Rightarrow linear konvergent

$$2) \quad \phi'(x) = 0 \quad \phi'(x) = 0$$

$$\phi(x) = x - \frac{f(x)}{f'(x)}$$

$$\phi'(x) = \frac{f'(x) \cdot f''(x) - f(x) \cdot f''(x)}{f'(x)^2}$$