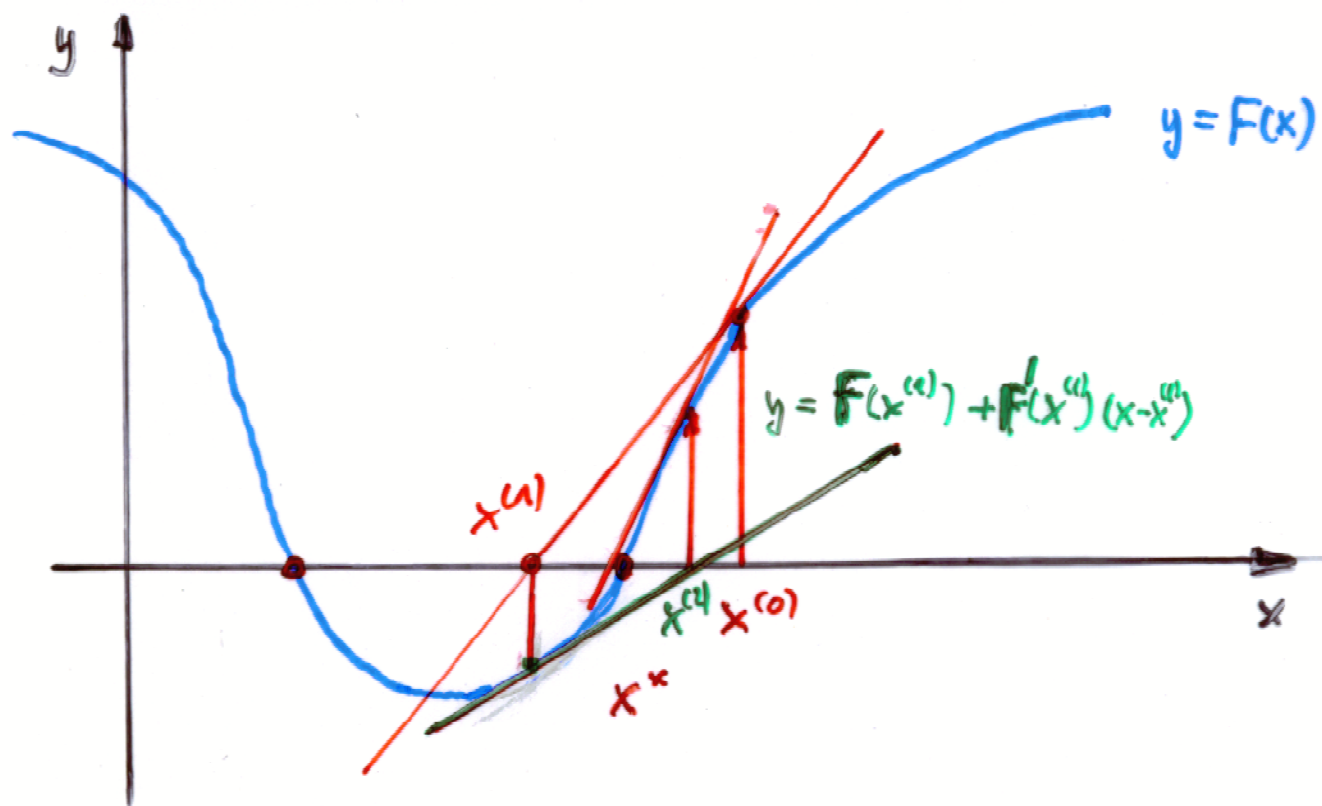


5.2. Das Newton-Verfahren

■ Motivation für den 1D-Fall $n=1$:



$$0 = F(x) \approx F(x^{(k)}) + F'(x^{(k)})(x - x^{(k)}) = 0$$



$$x^{(k+1)} = x^{(k)} - \frac{F(x^{(k)})}{F'(x^{(k)})}$$

■ In General:

$$F(x^*) = 0$$

$$x^* = x^{(k)} + w^{(k,r)} : F(x^{(k)} + w^{(k,r)}) = 0$$

2 Taylor

$$L(x^{(k+1)}) = F(x^{(k)}) + F'(x^{(k)})w^{(k,r)} = 0$$

where

$$F'(x) = \left[\frac{\partial F_i}{\partial x_j} \right]_{i,j=1,\dots,n} - \text{JACOBI-Matrix}$$

$$(3) \Rightarrow x^{(k+1)} = x^{(k)} + w^{(k,r)} \text{ with } F'(x^{(k)})w^{(k,r)} = -F(x^{(k)})$$

$p=w$
= NEWTON-Verfahren

LGS Defekt