

# Algoritmi Numerici (Parte II)

[Lezione 2] Algoritmo della secante e della tangente

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<https://colab.research.google.com/drive/1Iv2YA4iBL8g54yY1bdcRgtFNqI4LF7Kw>

# Ricorsioni

- Sequenza  $\mathbf{x_0, x_1, x_2, \dots}$  generata da una ricorsione
- (ex1) fattoriale  $\mathbf{x_{j+1} = (j + 1)x_j}$  (con  $\mathbf{x_0 = 1}$ )
- (ex2) Fibonacci  $\mathbf{x_{j+1} = x_j + x_{j-1}}$  (con  $\mathbf{x_0 = 1}$  e  $\mathbf{x_1 = 2}$ )
- ex1 ricorsione ordine 1,  
inizializzazione solo del primo elemento
- ex2 ricorsione ordine 2,  
inizializzazione dei primi due elementi

## Identificazione degli zeri mediante sequenze

- Approssimare zero  $\mathbf{x}^*$  di una funzione  $f(\mathbf{x})$ ?
- Sequenza  $\mathbf{x}_0, \mathbf{x}_1, \dots, \mathbf{x}_n$  che si avvicina ad  $\mathbf{x}^*$
- Convergenza:  $\lim_{n \rightarrow +\infty} |\mathbf{x}_n - \mathbf{x}^*| = 0$

### SECANTE

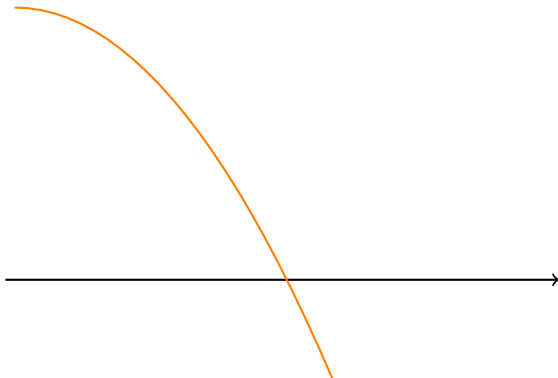
$$\mathbf{x}_{j+1} = \mathbf{x}_j - \frac{f(\mathbf{x}_j)}{\frac{f(\mathbf{x}_j) - f(\mathbf{x}_{j-1})}{\mathbf{x}_j - \mathbf{x}_{j-1}}}$$

### TANGENTE

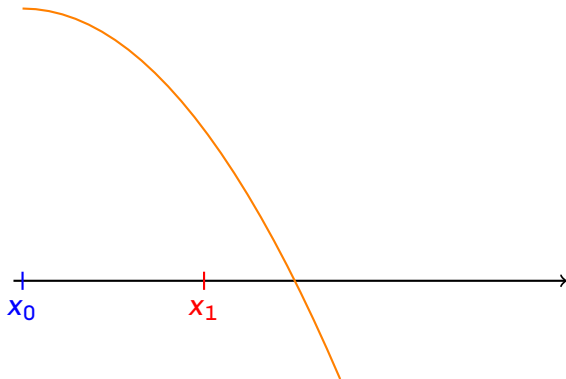
$$\mathbf{x}_{j+1} = \mathbf{x}_j - \frac{f(\mathbf{x}_j)}{f'(\mathbf{x}_j)}$$

*Nota: nessuno dei due algoritmi dà garanzie di convergenza*

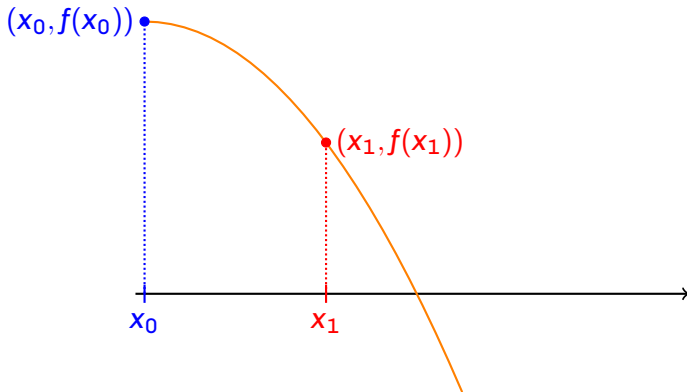
# Algoritmo della Secante



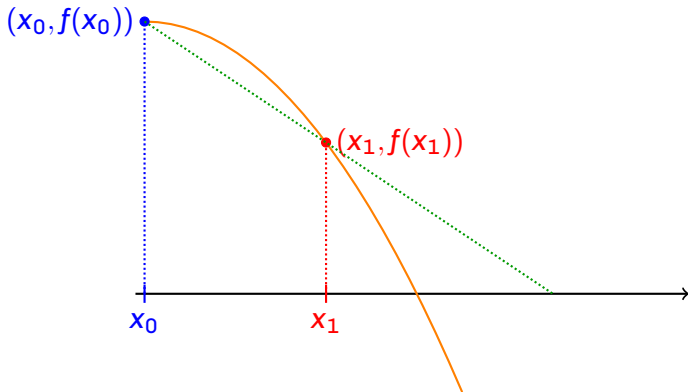
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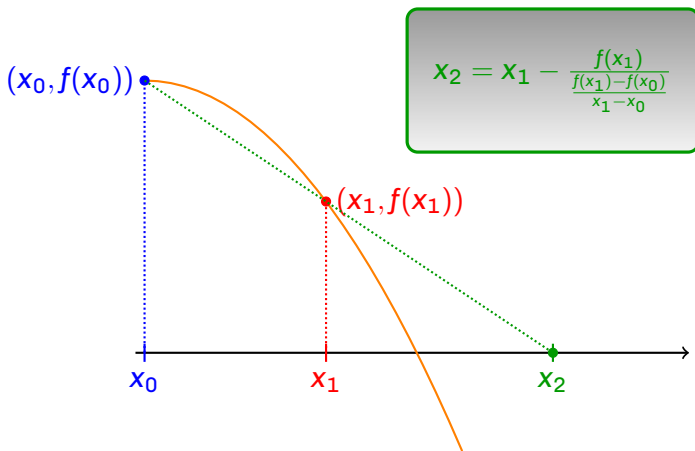
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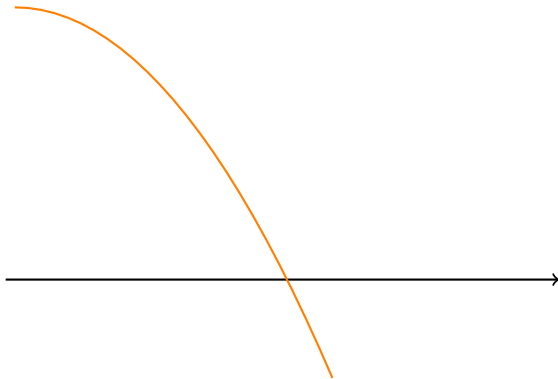


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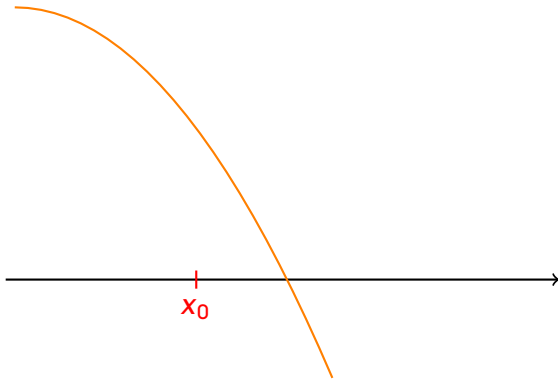




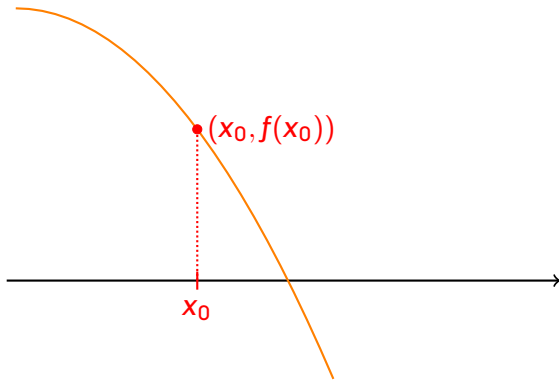
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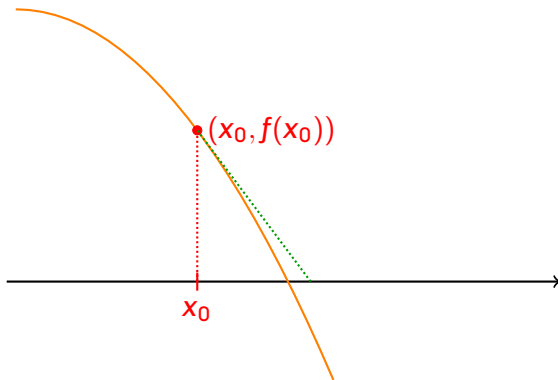
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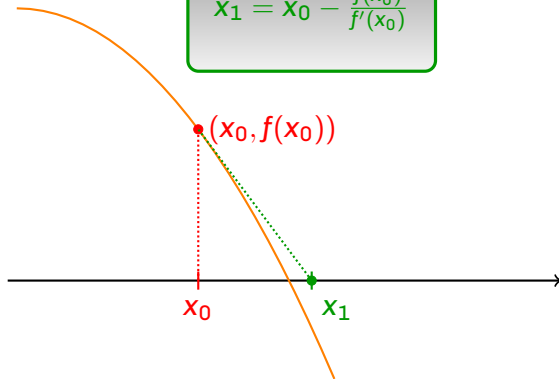


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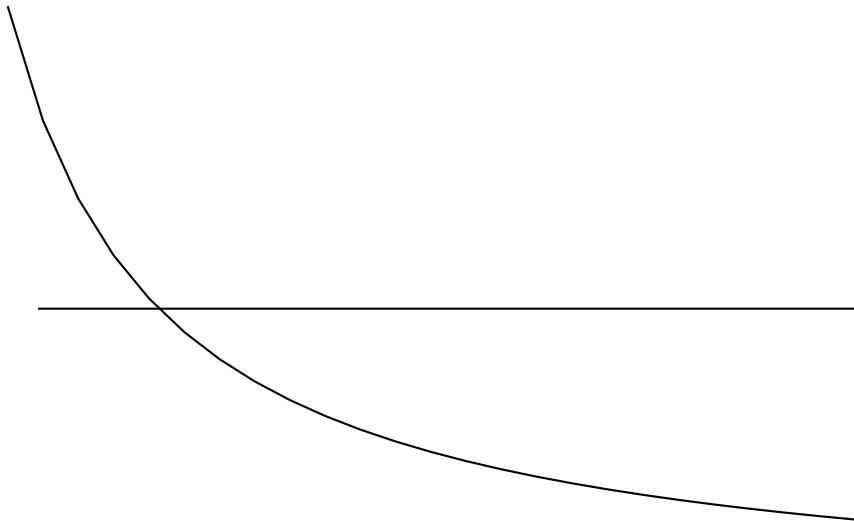


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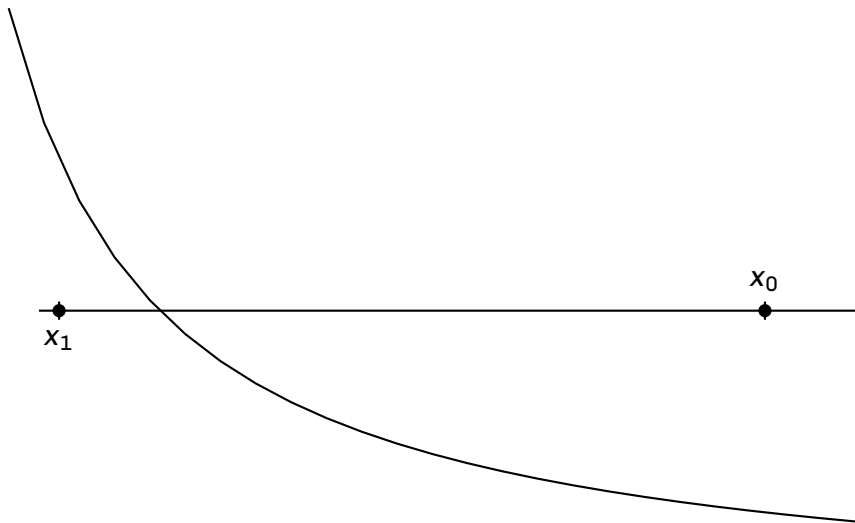
$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$



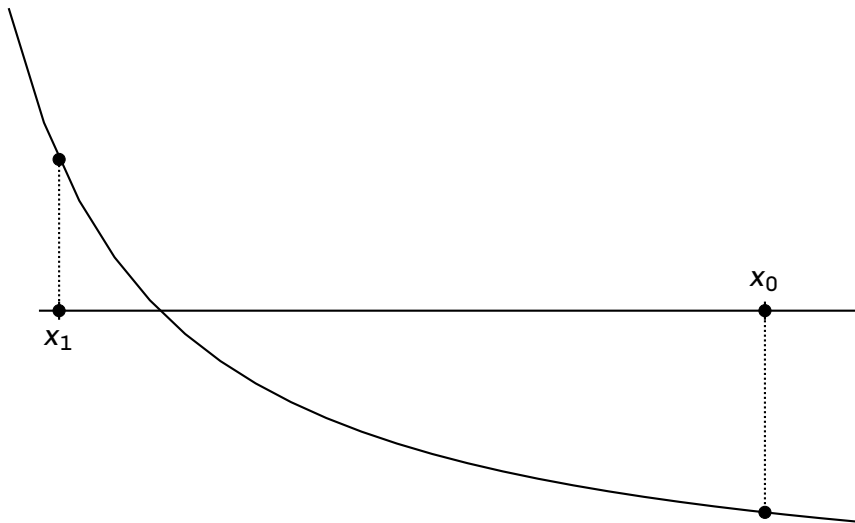
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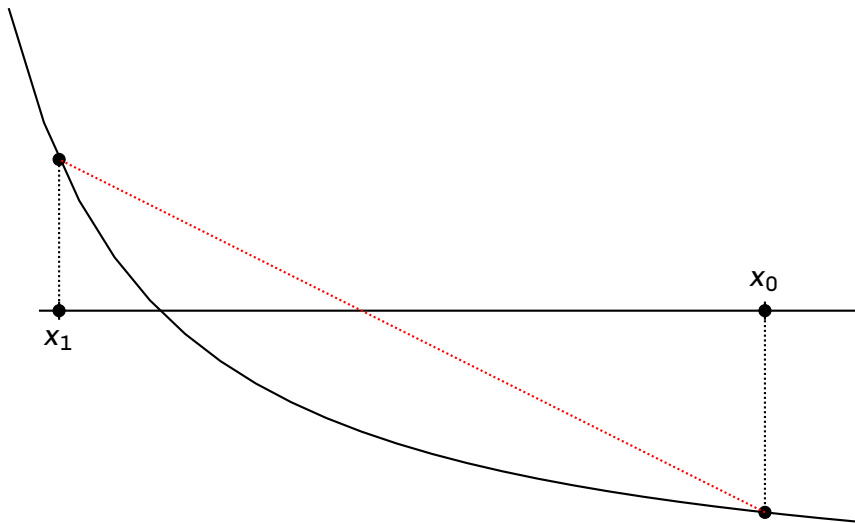


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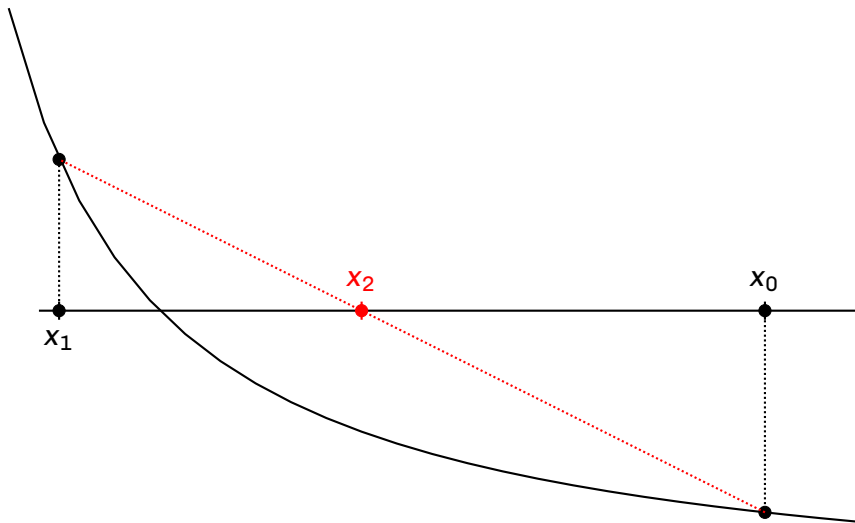




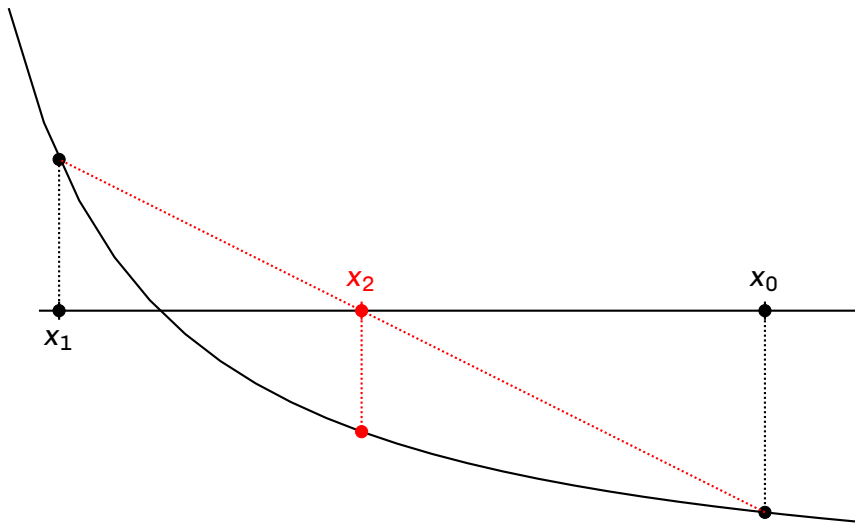
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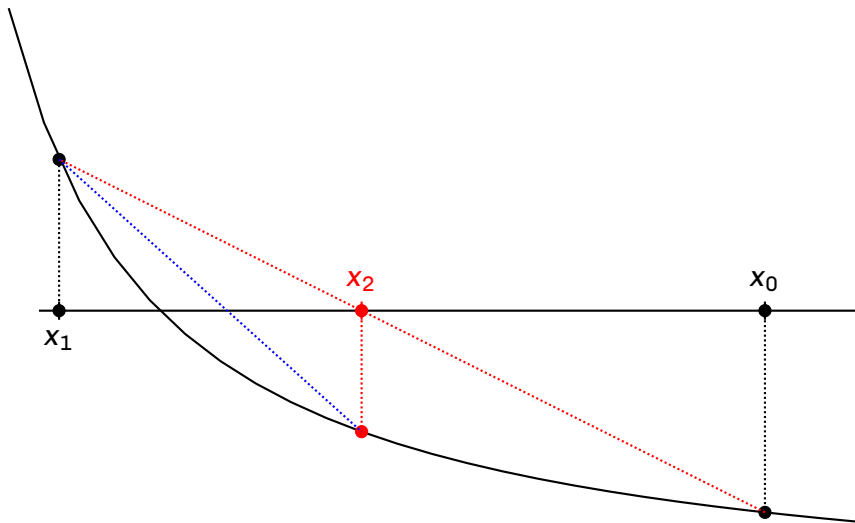
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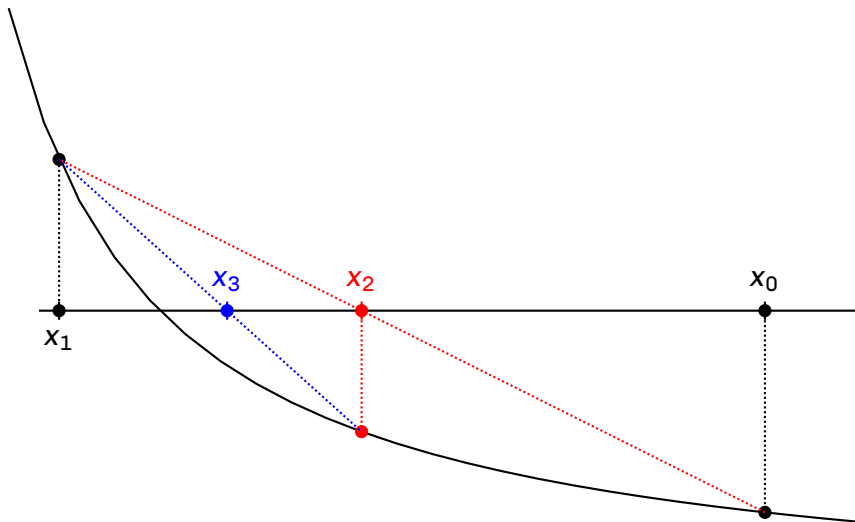
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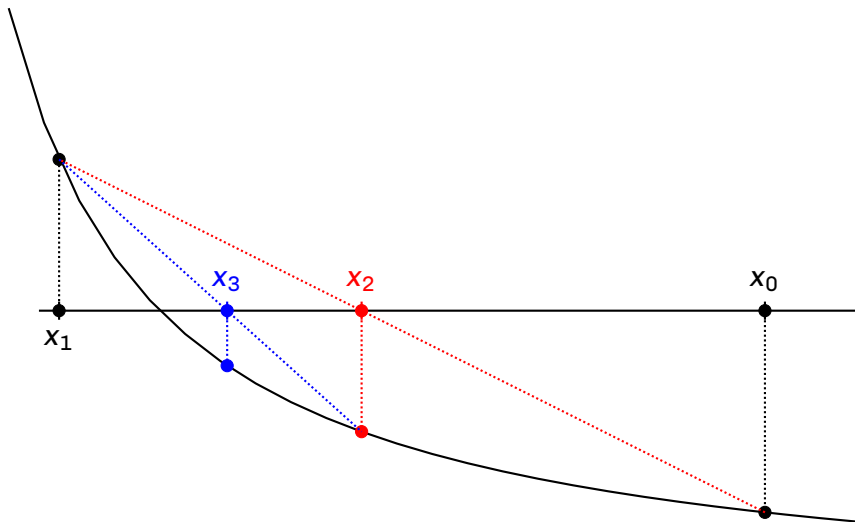
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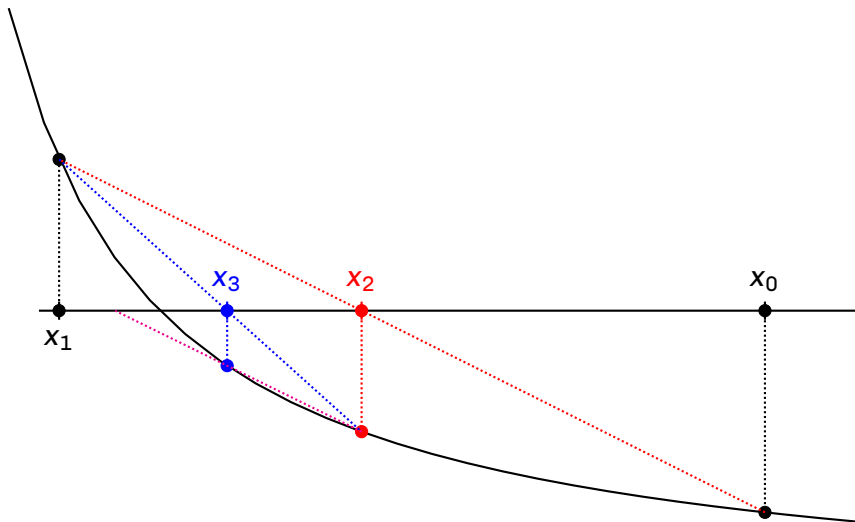
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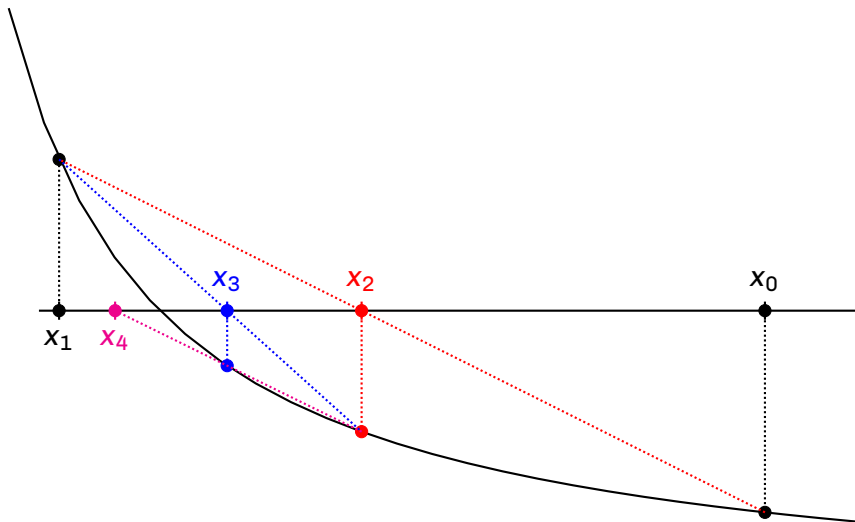
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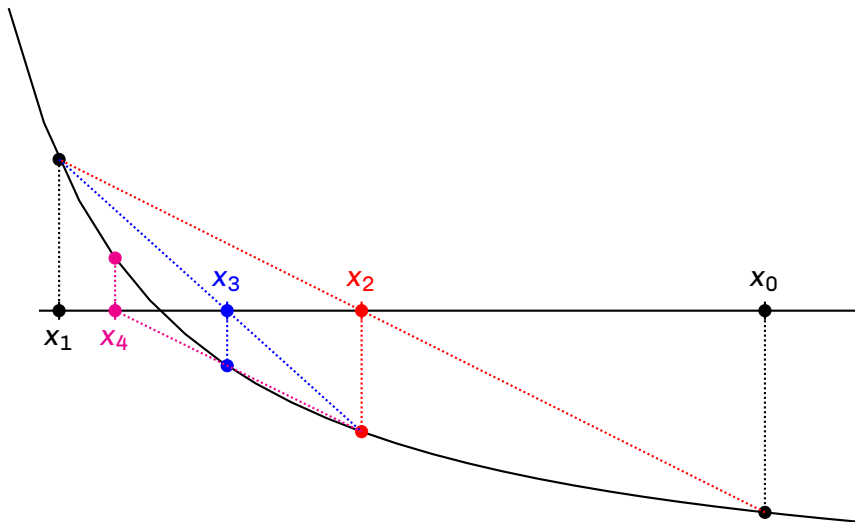


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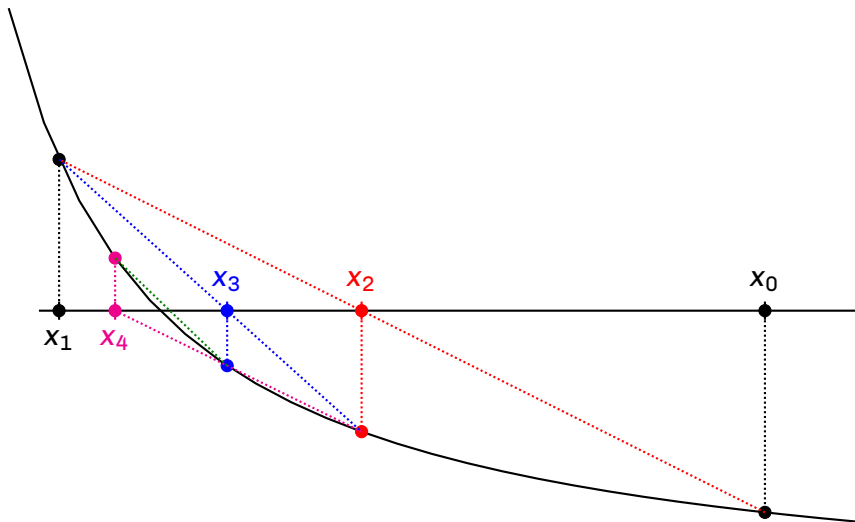




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