# Newton-Raphson-Verfahren

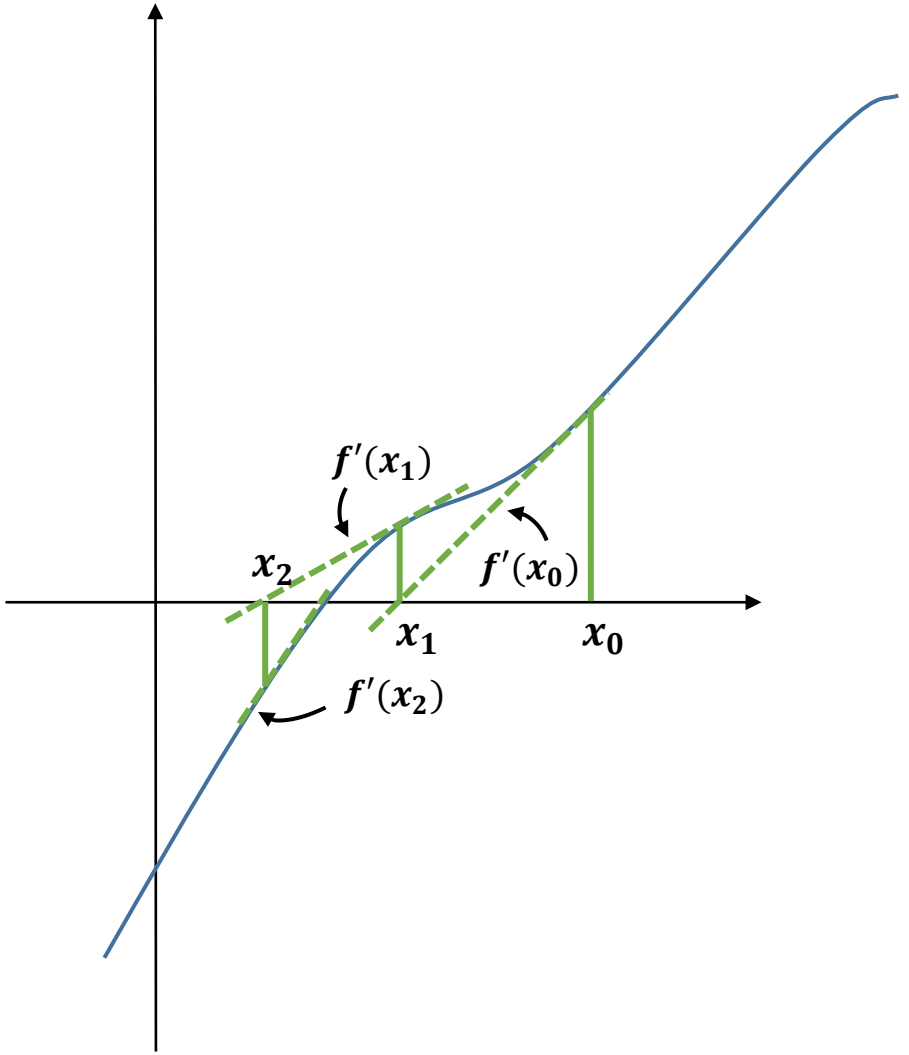
Programmieren in C | Grundlagen

# Newton-Raphson-Verfahren

$$f'(x_n) \cdot (x_n - x_{n+1}) = f(x_n) - 0$$

$$(x_n - x_{n+1}) = {f(x_n)}/{f'(x_n)}$$

$$x_{n+1} = x_n - {f(x_n)}/{f'(x_n)}$$



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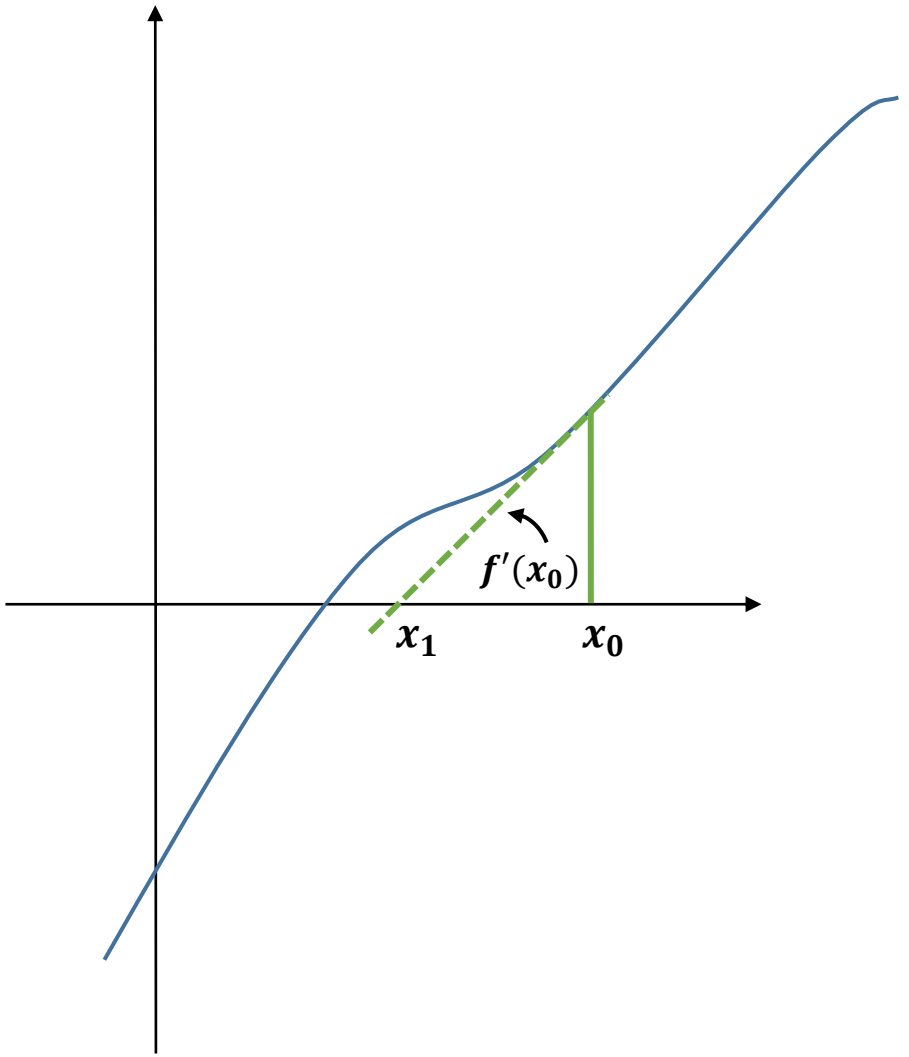

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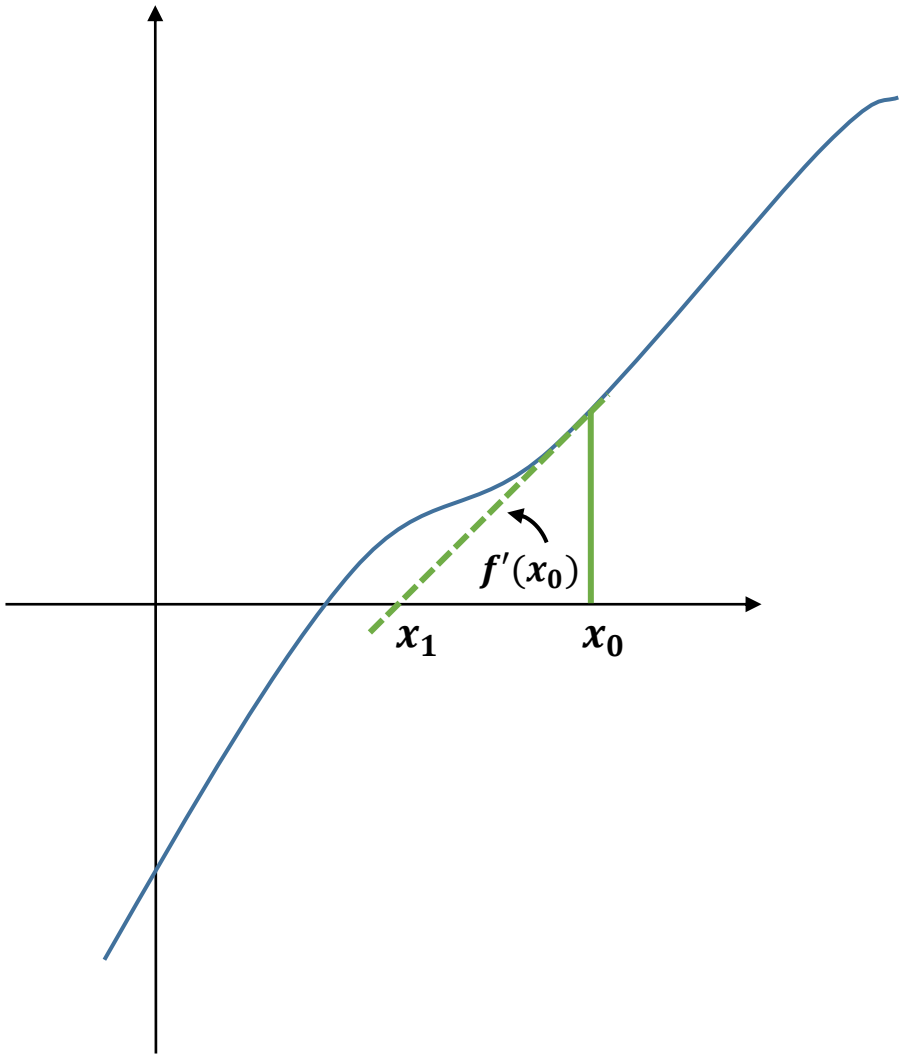

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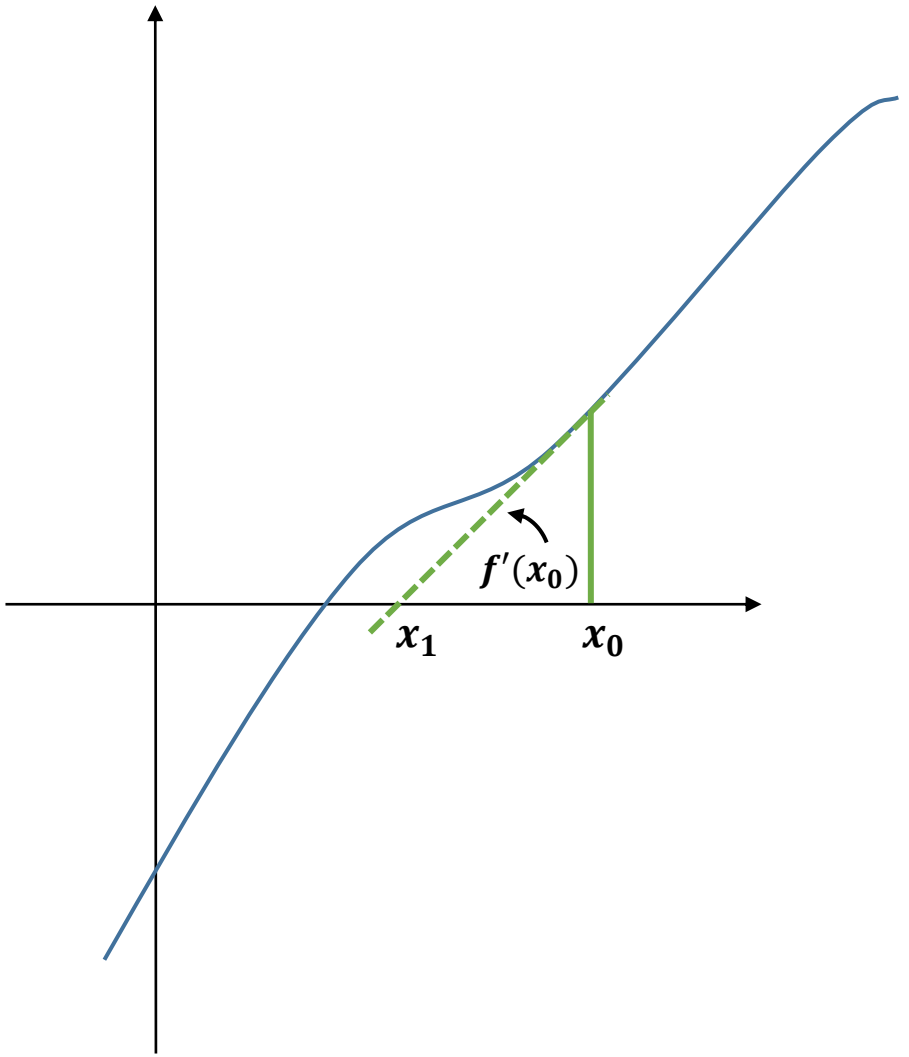

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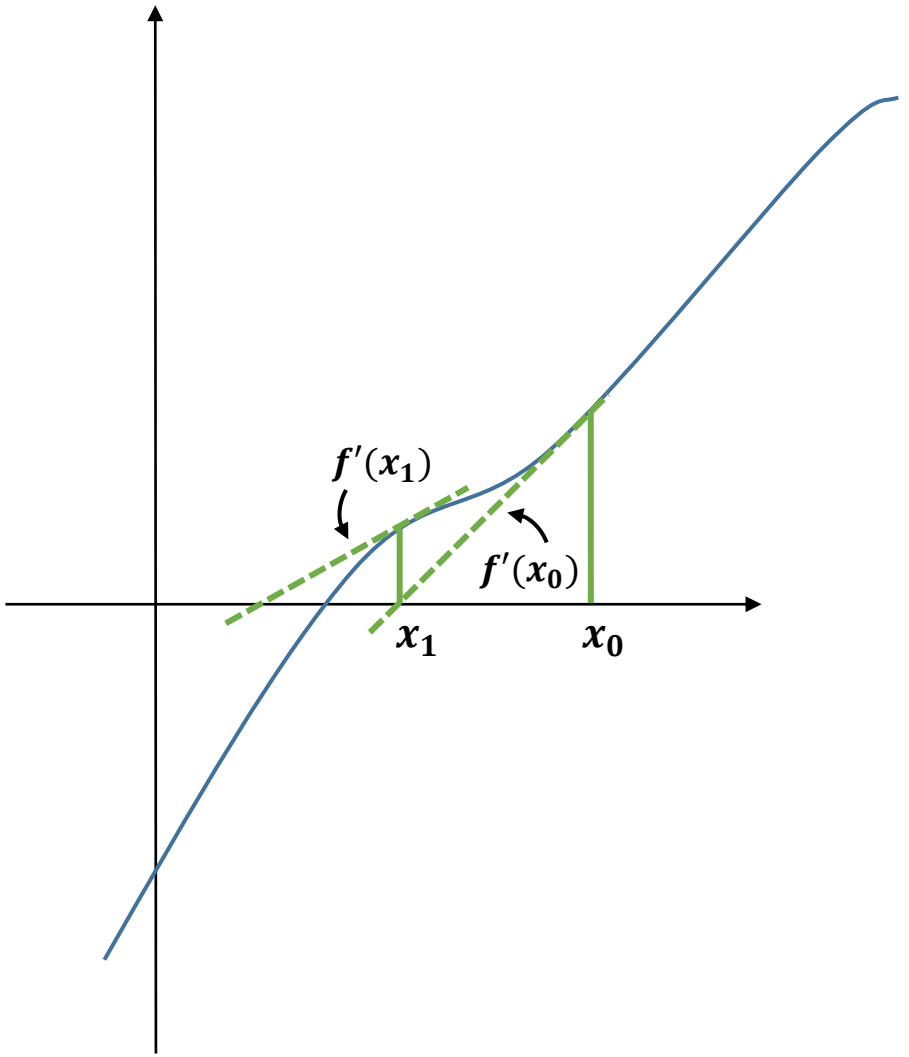

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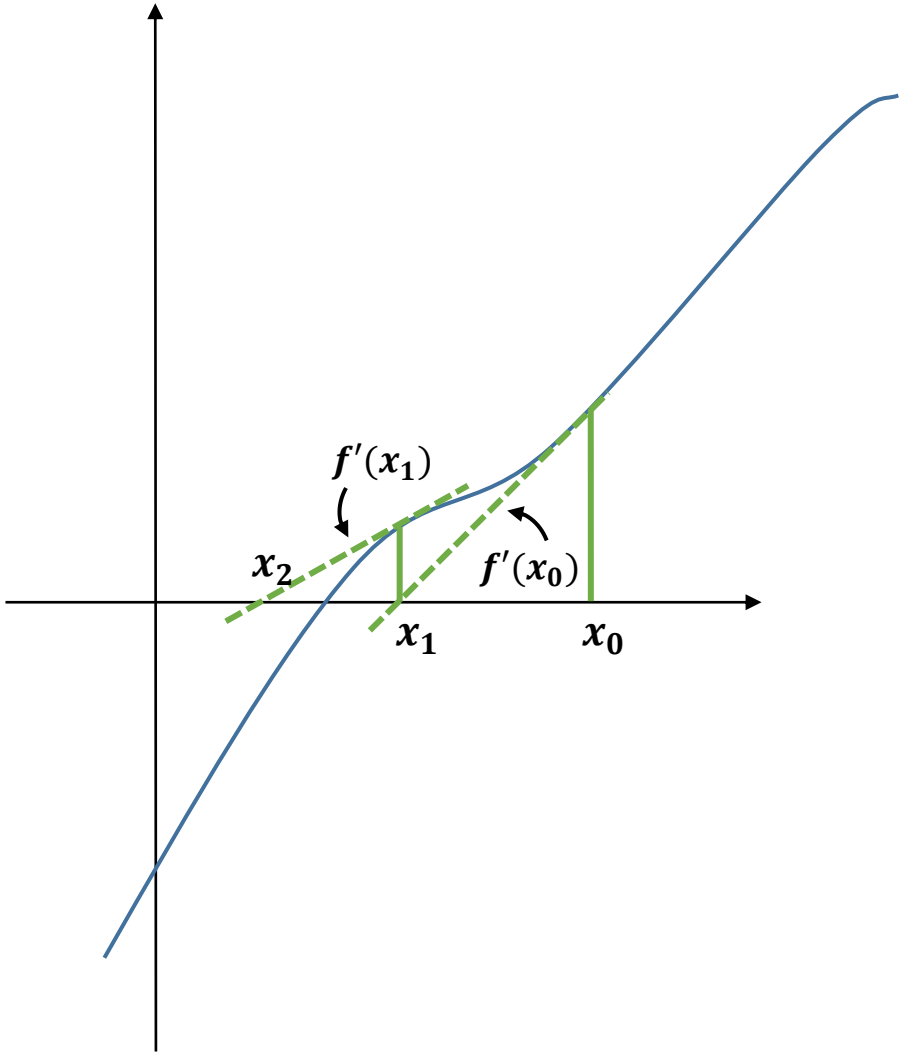

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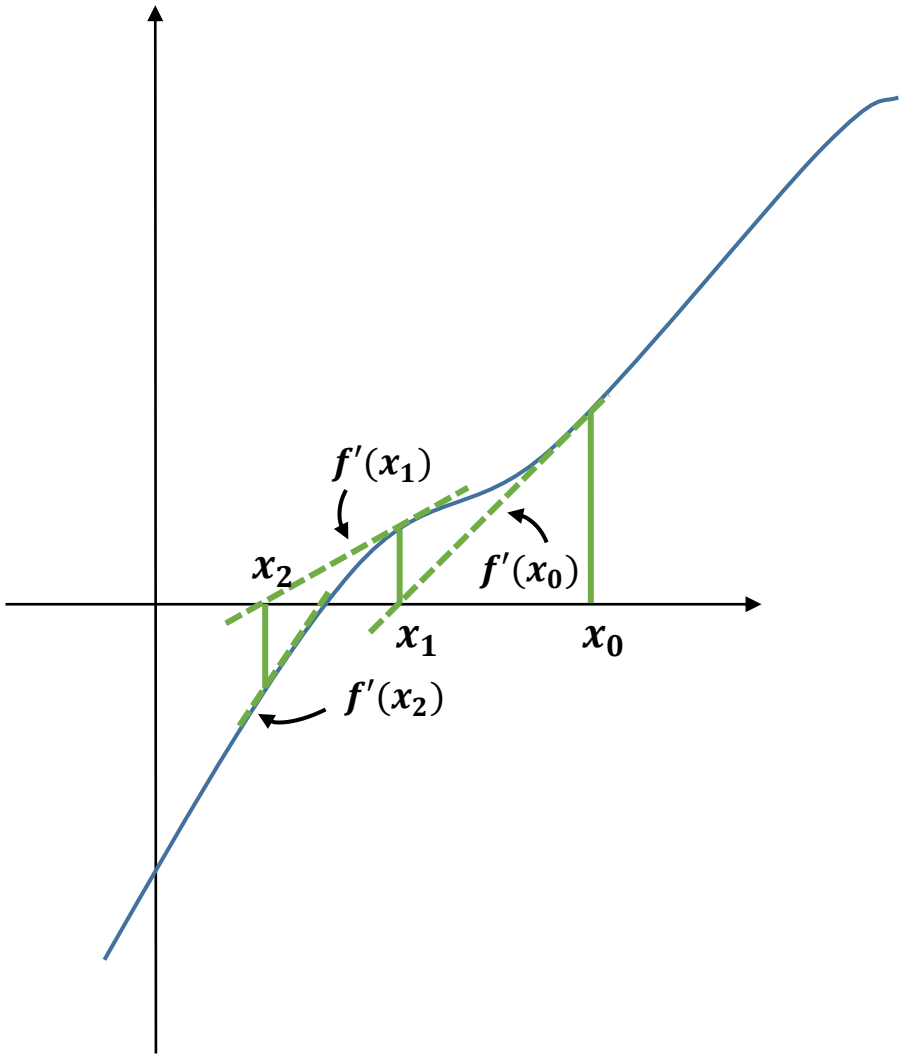

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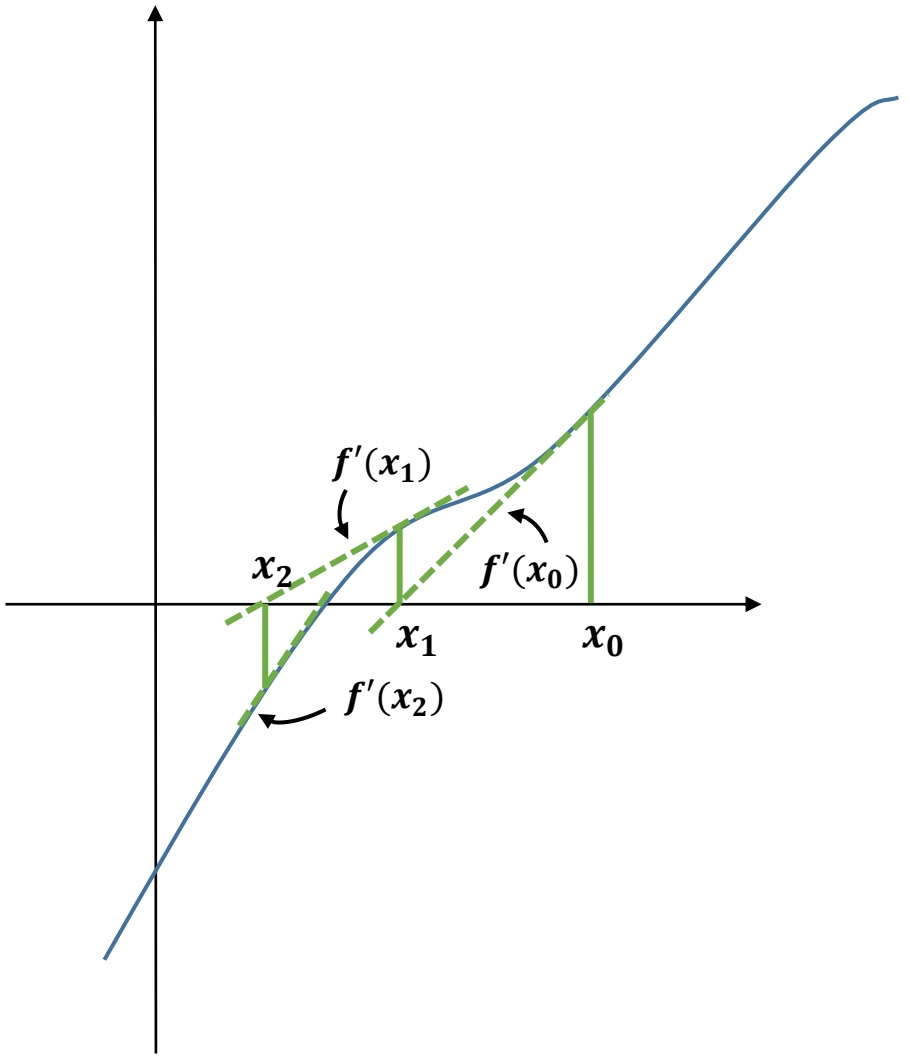


# Newton-Raphson-Verfahren

$$x_{n+1} = x_n - f(x_n) \Big/ f'(x_n)$$

# Newton-Raphson-Verfahren

$$f(x) = (x - 3)^2 \qquad f'(x) = 2(\mathrm{x} - 3) \qquad x$$

5

$$x_{n+1} = x_n - f(x_n) \Big/ f'(x_n)$$

# Newton-Raphson-Verfahren

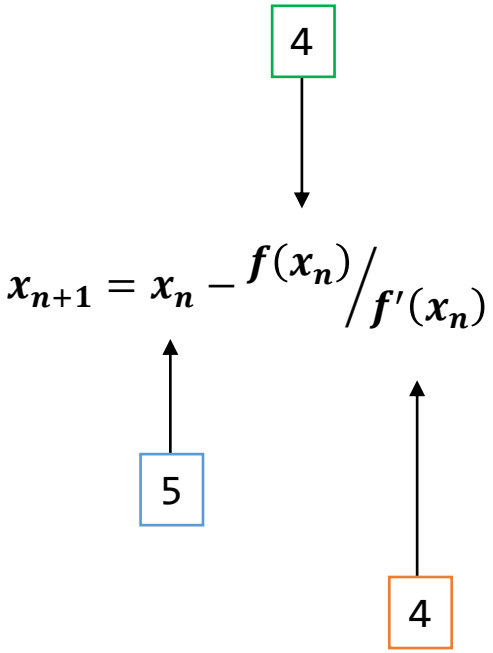
$$f(x) = (x - 3)^2$$

$$f'(x) = 2(x - 3)$$

| $x$ |
| --- |
| 5 |
| 4 |
| 4 |

$$x_{n+1} = x_n - f(x_n) \Big/ f'(x_n)$$

# Newton-Raphson-Verfahren




$f(x) = (x - 3)^2$

4

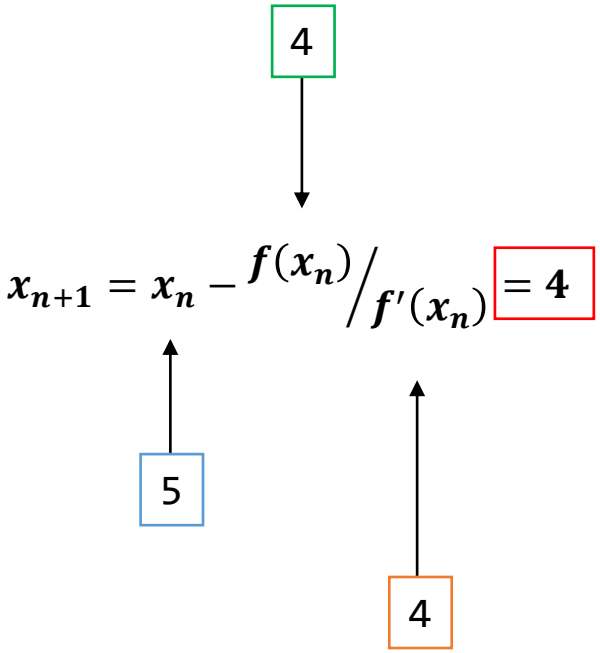
$f'(x) = 2(x - 3)$

4

$x$

5

# Newton-Raphson-Verfahren




$f(x) = (x - 3)^2$

4

$f'(x) = 2(x - 3)$

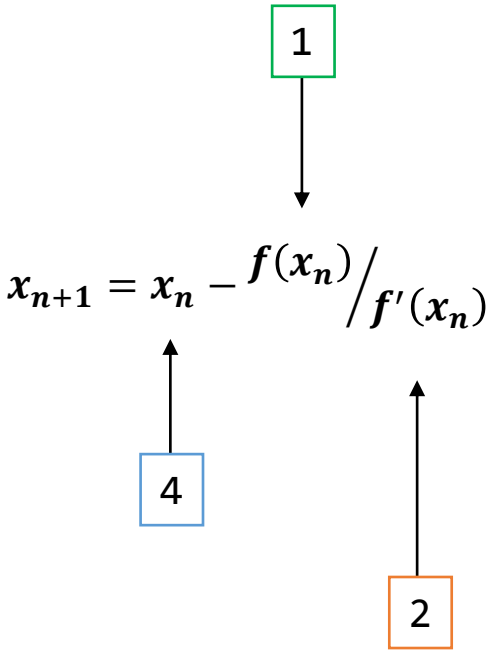
4

$x$

5

4

# Newton-Raphson-Verfahren




$f(x) = (x - 3)^2$

4

1

$f'(x) = 2(x - 3)$

4

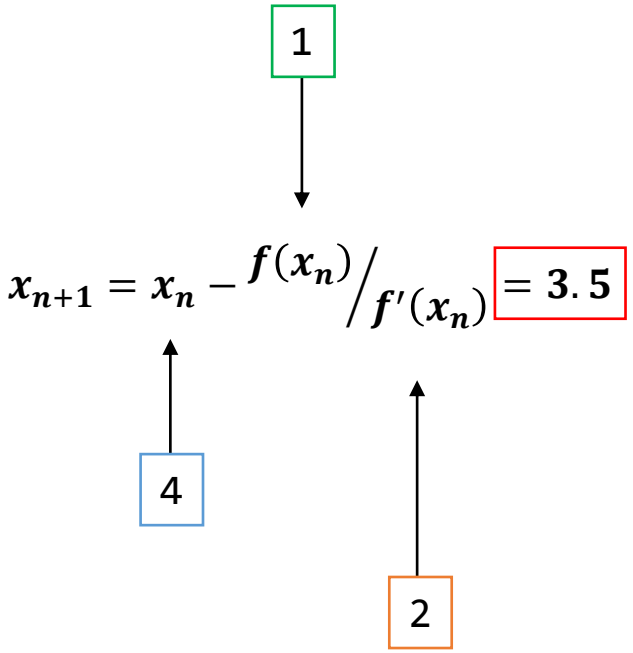
2

$x$

5

4

# Newton-Raphson-Verfahren




$f(x) = (x - 3)^2$

4

1

$f'(x) = 2(x - 3)$

4

2

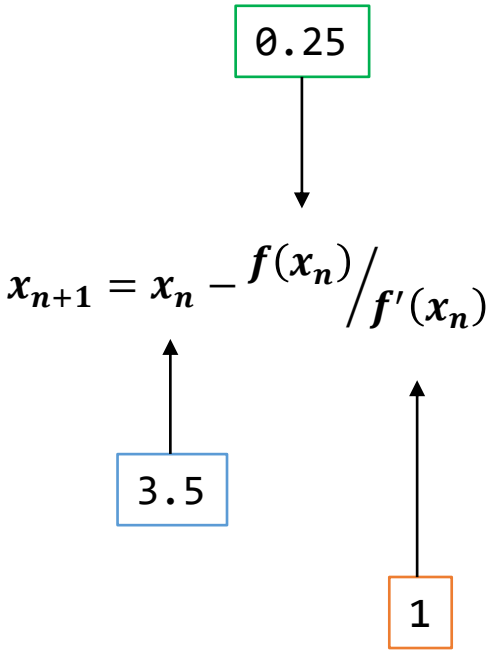
$x$

5

4

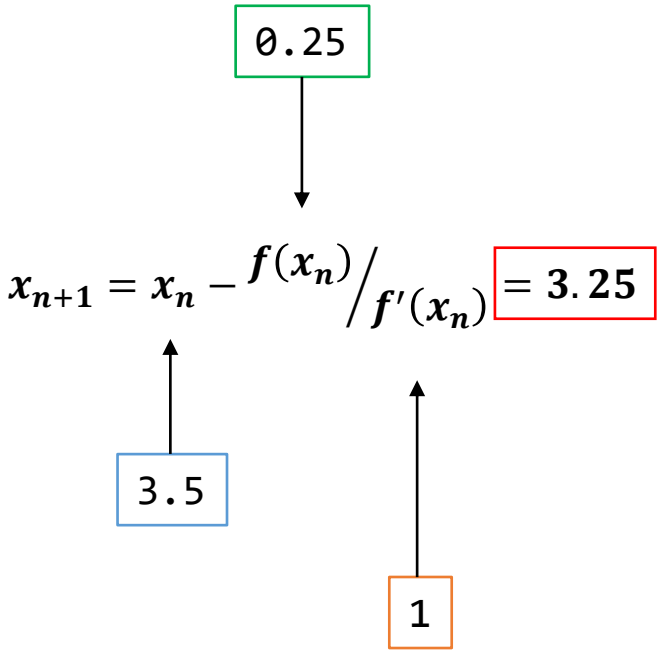
3.5

# Newton-Raphson-Verfahren



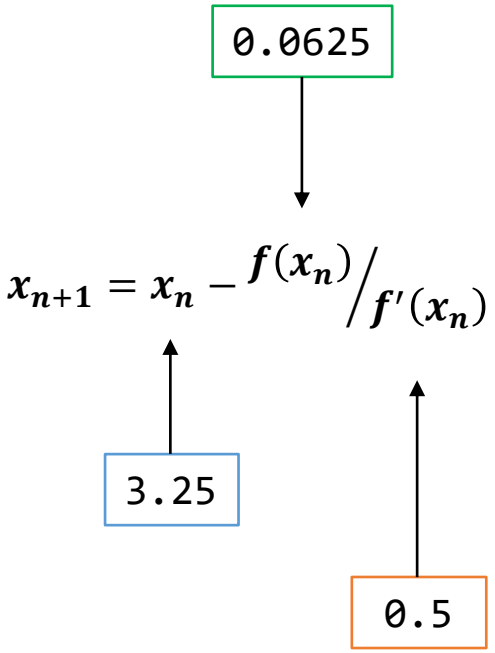

| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |

# Newton-Raphson-Verfahren



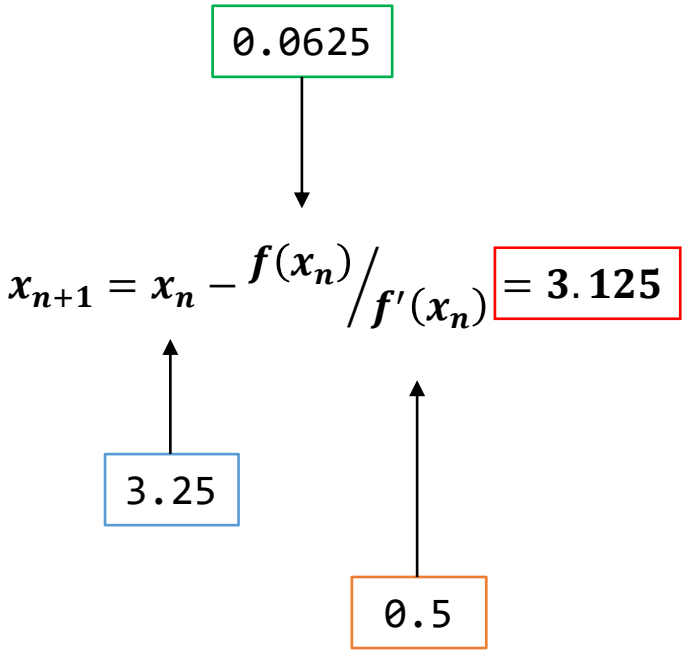

| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| | | 3.25 |

# Newton-Raphson-Verfahren



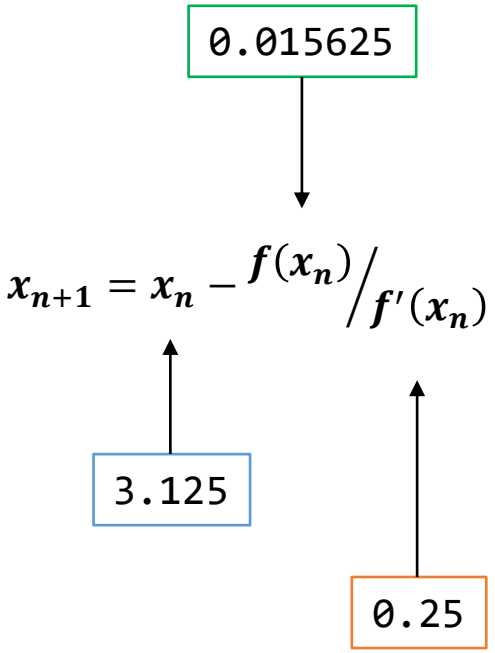

| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| 0.0625 | 0.5 | 3.25 |

# Newton-Raphson-Verfahren



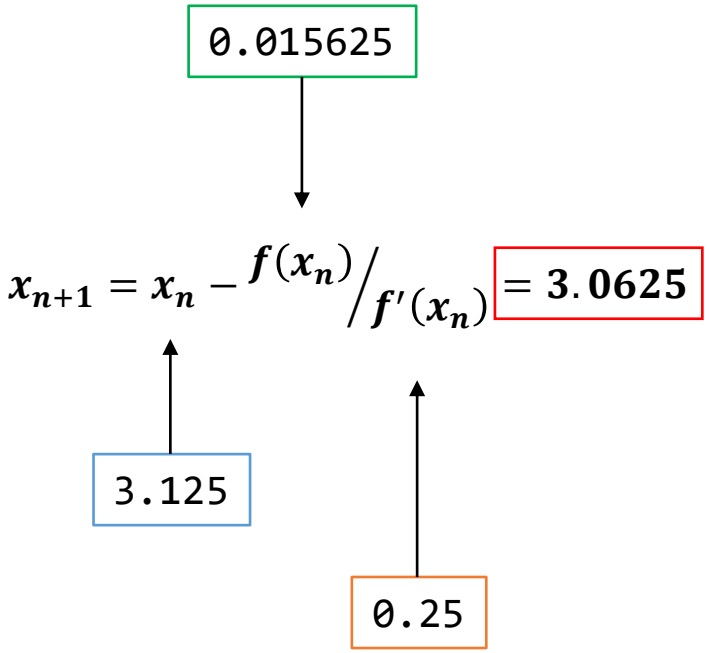

| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| 0.0625 | 0.5 | 3.25 |
| | | 3.125 |

# Newton-Raphson-Verfahren




| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| 0.0625 | 0.5 | 3.25 |
| 0.015625 | 0.25 | 3.125 |

# Newton-Raphson-Verfahren




| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| 0.0625 | 0.5 | 3.25 |
| 0.015625 | 0.25 | 3.125 |
| | | 3.0625 |

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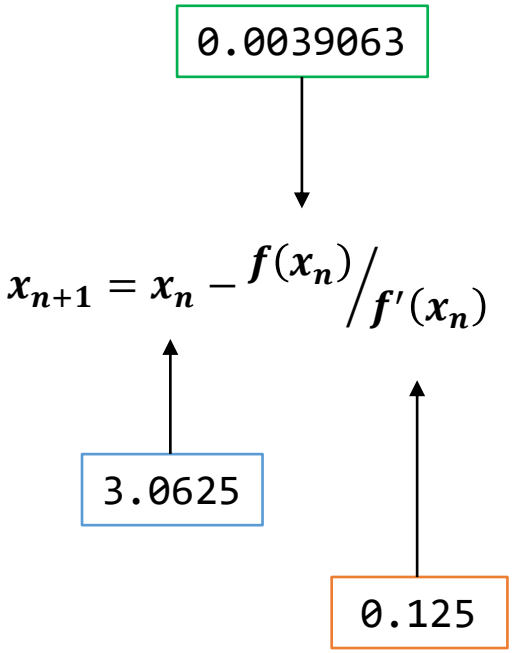


| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| 0.0625 | 0.5 | 3.25 |
| 0.015625 | 0.25 | 3.125 |
| 0.0039063 | 0.125 | 3.0625 |

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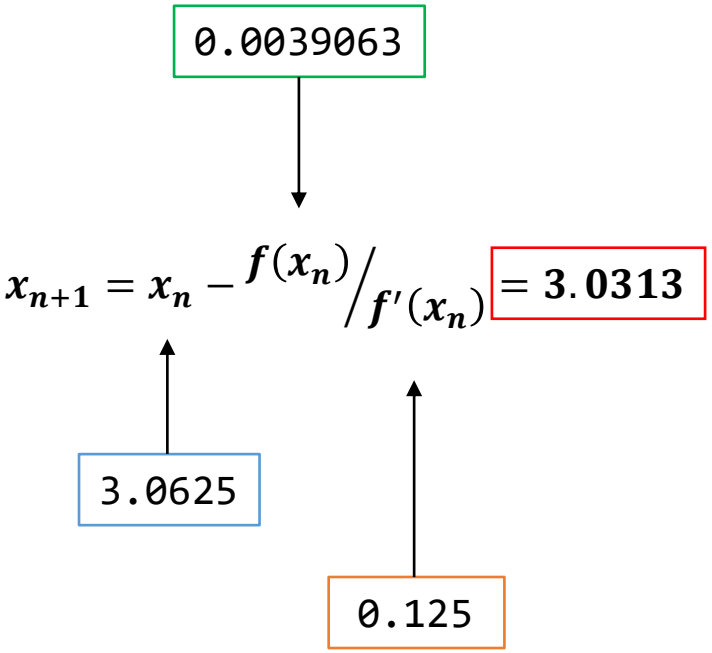


| $f(x) = (x-3)^2$ | $f'(x) = 2(x-3)$ | $x$ |
|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| 0.0625 | 0.5 | 3.25 |
| 0.015625 | 0.25 | 3.125 |
| 0.0039063 | 0.125 | 3.0625 |
| | | 3.0313 |

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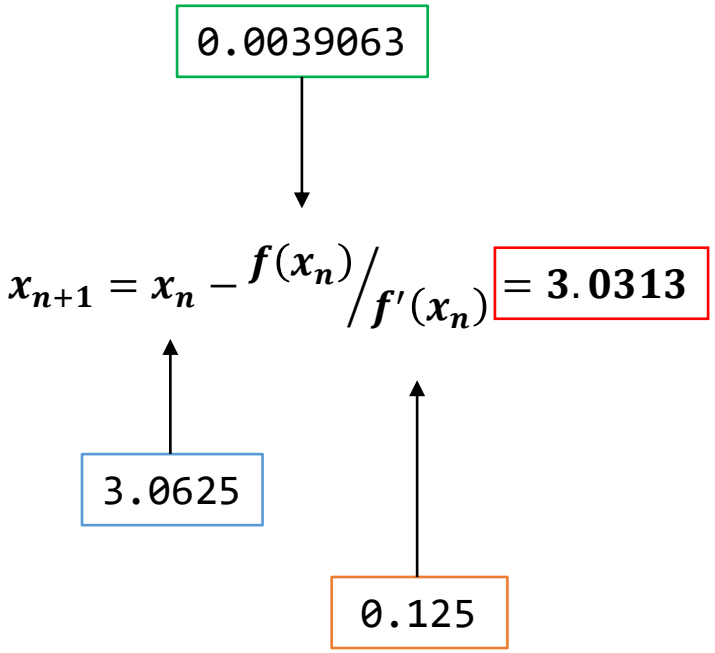


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|---|---|---|
| 4 | 4 | 5 |
| 1 | 2 | 4 |
| 0.25 | 1 | 3.5 |
| 0.0625 | 0.5 | 3.25 |
| 0.015625 | 0.25 | 3.125 |
| 0.0039063 | 0.125 | 3.0625 |
| | | 3.0313 |
| **0.0** | | **3.0** |