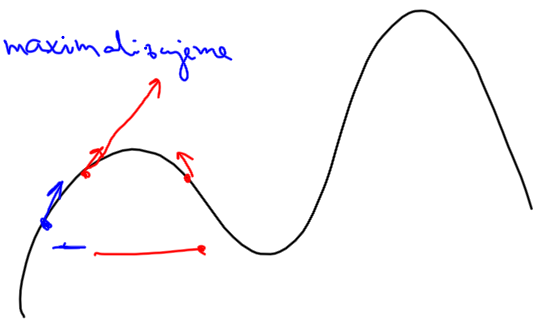
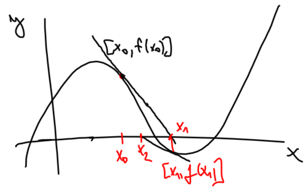


10 24-12:00

Newtonova metoda tečen:



tečna ke grafu f v $[x_n, f(x_n)]$:

$$y - f(x_n) = f'(x_n)\cdot(x - x_n)$$

bod na tečně (nebo obecně tečné nadrovině, pro nějž $y=0$]!

„x_{n+1}"

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

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

10 24-12:17

Př: numerické výpočet $\sqrt{\alpha}$, $\alpha \in R$.

$\beta^2 = \alpha$, tj. řešíme rovnici

$x^2 - \alpha = 0$

$$x_{n+1} = x_n - \frac{x_n^2 - \alpha}{2x_n} = \frac{x_n^2 + \alpha}{2x_n} = \frac{1}{2}\left(x_n + \frac{\alpha}{x_n}\right)$$

$\sqrt{12} = ?$

$x_0 = 2$

$x_1 = \frac{1}{2}\left(2 + \frac{12}{2}\right) = 4$

$x_2 = \frac{1}{2}\left(4 + \frac{12}{4}\right) = \frac{7}{2}$

$x_3 = \frac{1}{2}\left(\frac{7}{2} + \frac{24}{7}\right) \approx 3{,}46429$

$\sqrt{12} \approx 3{,}46410$

Nevhodná funkce: $y = f(x) = x^{\frac{1}{3}}$

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

$$x_{n+1} = x_n - \frac{x_n^{\frac{1}{3}}}{\frac{1}{3}\cdot x_n^{-\frac{2}{3}}} = x_n - 3\cdot x_n = -2x_n$$

osciluje

10 24-12:23

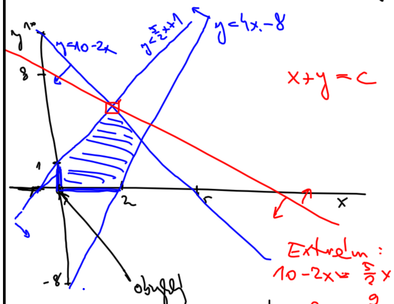
Příklad

Maximalizujte hodnotu $x + y$ za podmínek

$$4x - y \leq 8$$
$$2x + y \leq 10$$
$$5x - 2y \geq -2$$
$$x, y \geq 0$$

$2y \leq 5x + 2$

$y \leq \frac{5}{2}x + 1$



obejdeme pomocí simplexové metody

Extrém:

$10 - 2x = \frac{5}{2}x + 1$

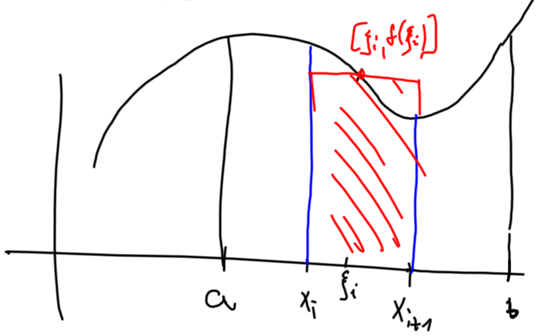
$9 = \frac{9}{2}x$

$x = 2$

$y = 6$

10 24-12:43

$$\int_a^b f(x)dx \approx \sum_{i=1}^{n-1} f(\xi_i)(x_{i+1} - x_i),$$

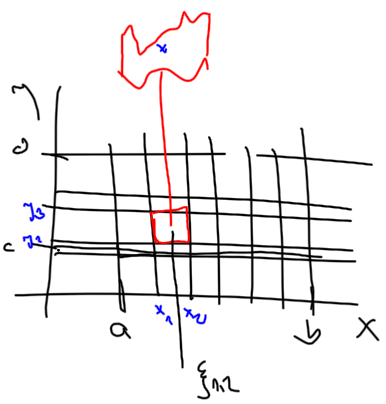


10 24-13:11

Př: funkce, která není R. integrovatelná

$$\chi(x) = \begin{cases} 1 & x \notin \mathbb{Q} \\ 0 & x \in \mathbb{Q} \end{cases}$$

10 24-13:14



Je-li R-int., píšeme $\iint_S f(x,y)\,dx\,dy$

nebo $\iint_S f(x,y)\,dS$

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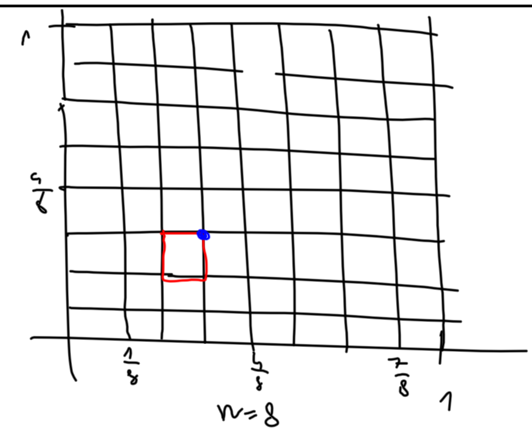

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$$\iint_S xy\,dx\,dy \overset{\text{BRZY}}{=} \int_0^1 \left(\int_0^1 xy\,dx \right) dy$$

$S = [0,1] \times [0,1]$

$$= \int_0^1 y \left[\frac{x^2}{2} \right]_0^1 dy = \int_0^1 \frac{1}{2} y\,dy = \frac{1}{4}$$

10 24-13:37