MINITEST HLEDÁNÍ EXTRÉMŮ NA HRANICI

$$f(x,y) = 3x - 4y + 23$$

$$g(x,y) = x^2 + 2y^2 - 17 = 0$$

Jacobiho metoda:

$$\partial_x f = 3 \qquad \partial_x g = 2x$$

$$\partial_y f = -4 \qquad \partial_y g = 4y$$

$$\Rightarrow$$

$$\partial_x f \, \partial_y g - \partial_y f \, \partial_x g = 0$$

$$12y + 8x = 0 \rightarrow x = -\frac{3}{2}y$$

$$x^2 + 2y^2 - 17 = 0$$

$$\frac{9}{4}y^2 + 2y^2 - 17 = 0 \quad / \cdot 4$$

$$9y^2 + 8y^2 - 17 \cdot 4 = 0$$

$$\cancel{17}y^2 - \cancel{17} \cdot 4 = 0$$

$$y^2 = 4$$

$$y_1 = 2, \; y_2 = -2$$

$$x_1 = -3, \; x_2 = 3$$

$\Rightarrow$ SEZNAM KANDIDÁTŮ

$$f(3,-2) = 9 + 8 + 23 = 40 \quad \text{MAX}$$

$$f(-3;2) = -9 - 8 + 23 = 6 \quad \text{MIN}$$

Metoda Lagrangeových multiplikátorů:

$$\partial_x f + \lambda \partial_x g = 0 \qquad \text{I)}\ 3 + 2\lambda x = 0$$
$$\partial_y f + \lambda \partial_y g = 0 \quad \Rightarrow \quad \text{II)}\ -4 + 4\lambda y = 0$$
$$g = 0 \qquad \text{III)}\ x^2 + 2y^2 - 17 = 0$$

$1.\ \lambda \neq 0 \rightarrow x = -\frac{3}{2\lambda}$

$1.\ \lambda \neq 0 \xrightarrow{\text{I)}} x = -\frac{3}{2\lambda}$

$\xrightarrow{\text{II)}} y = +\frac{1}{\lambda}$ dosadíl do III $\quad \frac{9}{4\lambda^2} + \frac{2}{\lambda^2} - 17 = 0 \,/\cdot 4\lambda^2$

$$\cancel{(9+8) = (17) \cdot 4\lambda^2}$$

$$\Rightarrow \lambda^2 = \frac{1}{4}$$

$$\lambda_1 = \frac{1}{2} \qquad \lambda_2 = -\frac{1}{2}$$

$x_1 = -3 \qquad x_2 = 3$

$y_1 = 2 \qquad y_2 = -2$

KANDIDÁTI $\quad f(-3;2) = 6 \qquad f(3;-2) = 40$

MIN $\qquad$ MAX

POZOR MUSÍME JEŠTĚ DISKUTOVAT

$2.\ \lambda = 0 \xrightarrow{\text{I)}} 3 \neq 0$ ... NEMÁ ŘEŠENÍ!