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Lista 8

① ⓐ $x^2 + 3xy + 4y^2 - 6x + 2y$

$\frac{\partial}{\partial x} = 2x + 3y - 6 \qquad \frac{\partial}{\partial y} = 3x + 8y + 2$

$\begin{cases} 2x + 3y - 6 \\ 3x + 8y + 2 \end{cases} \rightarrow \begin{matrix} 6x + 9y - 18 \\ -6x - 16y - 4 \end{matrix} \rightarrow -7y - 22 \rightarrow y = \frac{22}{-7}$

$\left(\frac{54}{7}, -\frac{22}{7}\right) \qquad \begin{matrix} 16x + 24y - 48 \\ -9x - 24y - 6 \end{matrix} \rightarrow 7x - 54 \rightarrow x = \frac{54}{7}$

mínimo local

ⓑ $x^2 + y^3 + xy - 3x - 4y + 5$

$\frac{\partial}{\partial x} = 2x + y - 3 \qquad \frac{\partial}{\partial y} = 3y^2 + x - 4$

$\frac{\partial^2}{\partial x^2} = 1 \qquad \frac{\partial^2}{\partial y^2} = 6y \qquad (1,1)$

ⓒ $x^3 + 2xy + y^2 - 5x$

$\frac{\partial}{\partial x} = 3x^2 + 2y - 5 \rightarrow \frac{\partial}{\partial y} = 6x \qquad (-1,1)$

$\frac{\partial}{\partial y} = 2x + 2y \rightarrow \frac{\partial}{\partial y^2} = 1$

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(D) $-x^2+y^2+2xy+4x-2y$

$\frac{\partial}{\partial x} = -2x+2y+4$ $\quad \begin{cases} -2x+2y+4 \\ 2x+2y-2 \end{cases} \div 2 \quad \begin{matrix} -x+y+2 \\ x+y-1 \end{matrix}$

$\frac{\partial}{\partial x} = 2y+2x-2$ $\quad -x+y+2 \div 2y+1 \div y = -1$ $\quad x+y-1 \quad -2$

$\left(\frac{3}{2}, -\frac{1}{2}\right)$ $\quad -x+y+2 \div -2x+3 \div x = \frac{3}{2}$ $\quad -x+y+1$

(E) x^3-3x^2y+27y

$\frac{\partial}{\partial x} = 3x^2-6xy$ $\quad \left(3, \frac{3}{2}\right)$

$\frac{\partial}{\partial y} = -3x^2+27$ $\quad \left(-3, -\frac{3}{2}\right)$

(F) $x^2-4xy+4y^2-x+3y+1$

$\frac{\partial}{\partial x} = 2x-4y-1$ Não admite ponto crítico

$\frac{\partial}{\partial y} = 4x+8y+3$

(G) $\sqrt[3]{x^2+2xy+4y^2-6x-12y}$

(21) pontos de mínimos locais

(H) $x^4+y^4-2x^2-2y^2$

$\frac{\partial}{\partial x} = 4x^3-4x$

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$\frac{\partial}{\partial y} = 4y^3 - 4y$ (0,0) Ponto de máximo local

① $x^4 + xy + y^2 - 6x - 5y$

$\frac{\partial}{\partial x} = 4x^3 + y - 6$ $\begin{cases} 4x^3+y-6 \\ x+2y-5 \end{cases}$

$\frac{\partial}{\partial y} = x + 2y - 5$ (1,2) Ponto de mínimo local

⑤ $x^4+y^4+4x+4y$

$\frac{\partial}{\partial x} = 4x^3+4$ $4x^3+4$ (-1,-1) Ponto de mínimo local

$4y^3+4$

$\frac{\partial}{\partial y} = 4y^3+4$

⑪ $x^5 + y^5 - 5x - 5y$ (1,1) é o Ponto de mínimo local

$\frac{\partial}{\partial x} = 5x^4 - 5$

$\frac{\partial}{\partial y} = 5y^4 - 5$

⑬ $\frac{1}{x^2} + \frac{1}{y} + xy$ $x>0$ $y>0$

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③ ⓐ $x^2 + 2xy + 2y^2 - x + 2y$

$\frac{\partial}{\partial x} = 2x + 2y - 1$ $\begin{cases} 2x+2y-1 \\ 2x+4y+2 \end{cases}$

$\frac{\partial}{\partial y} = 2x + 4y + 2$ $2x+2y-1 \rightarrow -2y-3 \rightarrow y = \frac{3}{2}$ $\quad -2x-4y-2$

$\left(2, -\frac{3}{2}\right)$ $-4x-4y+2 \rightarrow -2x+4 \rightarrow x = \frac{4}{2} \rightarrow 2$ $\quad 2x+4y+2$

Ⓑ $x^2 - y^2 - 3xy + x + 4y$

$\frac{\partial}{\partial x} = 2x - 3y + 1$ $\begin{cases} 2x-3y+1 \\ -3x+2y+4 \end{cases}$ Não admite

$\frac{\partial}{\partial y} = 2y - 3x + 4$

ⓒ $x + 2y - 2xy - x^2 - 3y^2$

$\frac{\partial}{\partial x} = 1 - 2y - 2x$ $\begin{cases} 2x-2y+1 \\ -2x-6y+2 \end{cases}$ $\left(\frac{1}{4}, \frac{1}{4}\right)$

$\frac{\partial}{\partial y} = 2 - 2x - 6y$ $2x-2y+1 \rightarrow -8y+3 \rightarrow y = \frac{3}{8}$ $\quad -2x-6y+2$

Ⓓ $3x^2 + y^2 + xy - 2x - 2y$

$\frac{\partial}{\partial x} = 6x + y - 2$ $\begin{cases} 6x+y-2 \\ x+2y-2 \end{cases}$ $-12x-2y+4 \rightarrow -11x+2 \rightarrow x = \frac{2}{11}$ $\quad x+2y-2$

$\frac{\partial}{\partial y} = 2y + x - 2$ $6x+y-2 \rightarrow -11y+10 \rightarrow y = -\frac{10}{11}$ $\quad -6x-12y+12$ $\left(\frac{2}{11}, -\frac{10}{11}\right)$

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(e) $x^2 + 2y^2 + 3xy + 2x + 2y$

Não admite

(f) $x^2 + y^2 - 2x - 4y$

$\partial = 2x - 2$ (1,2) Ponto de mínimo Global

∂x

$\partial = 2y - 4$

∂y

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