Determinante 1

$$\begin{vmatrix} \frac{\partial^2 f}{\partial x^2} & \frac{\partial^2 f}{\partial x \partial y} \\ \frac{\partial^2 f}{\partial y \partial x} & \frac{\partial^2 f}{\partial y^2} \end{vmatrix}$$

$P=(x,y)$

Condições

$|Hf|_P > 0 \quad \frac{\partial^2 f}{\partial x^2} > 0 \Rightarrow$ mínimo.

$|Hf|_P > 0 \quad \frac{\partial^2 f}{\partial x^2} < 0$ — máximo

$|Hf| < 0 \Rightarrow$ não há extremo, é ponto de sela

Depois de calculadas as derivadas parciais, troca o ponto e verifica condição.

Teorema Schwarz

$$\begin{vmatrix} \frac{\partial^2 f}{\partial x^2} & \frac{\partial^2 f}{\partial x \partial y} \\ \frac{\partial^2 f}{\partial y \partial x} & \frac{\partial^2 f}{\partial y^2} \end{vmatrix}$$

2.

$x^2+y^2+z^2=1$

$(x^2+y^2+z^2-1)=0$

$f(x,y,z) = x - 2y + 2z$

$L(x,y,\lambda) = f(x,y,z) + \lambda(\varphi(x,y,z))$

$L(x,y,z,\lambda) = x - 2y + 2z + \lambda(x^2+y^2+z^2-1)$

$$\begin{cases} \frac{\partial L}{\partial x} = 0 \\ \frac{\partial L}{\partial y} = 0 \\ \frac{\partial L}{\partial z} = 0 \\ \frac{\partial L}{\partial \lambda} = 0 \end{cases} \Leftrightarrow \begin{cases} 1 + 2x^2\lambda = 0 \\ -2 + 2y\lambda = 0 \\ 2 + \lambda 2z = 0 \\ x^2+y^2+z^2-1 = 0 \end{cases} \Leftrightarrow \begin{cases} \lambda = -\frac{1}{2x^2} \\ \lambda = \frac{1}{y} \\ \lambda = -\frac{1}{z} \end{cases}$$

$-\frac{1}{2x^2} = \frac{1}{y}$

$y = -2x^2$

$\frac{1}{y} = -\frac{1}{z} \Rightarrow \boxed{y = -z}$

$-\frac{1}{2x^2} = -\frac{1}{z} \Leftrightarrow$

$\Leftrightarrow -2x^2 = -z$

$\boxed{z = 2x^2}$

$x^2 + (-2x^2)^2 + (2x^2)^2 - 1 = 0$

e tira o valor de x

$x^2 + 4x^4 + 4x^4 - 1 = 0$

$8x^4 + x^2 - 1 = 0 =$

$8t^2 + t - 1 = 0$

$x = t^2$

$x^4 = t^2$

$x^2 = t$

$t = \frac{-1 \pm \sqrt{1+32}}{16}$

$y <$ ... $y <$ ...