Ejercicios de Cálculo

Temas: Derivadas en n variables: Extremos relativos

Titulaciones: Todas

Alfredo Sánchez Alberca (asalber@ceu.es)





Estudiar los extremos relativos de la función $f(x,y) = x^2y + \frac{1}{x} + \frac{1}{y}$.

Estudiar los extremos relativos de la función f.

Datos

$$\nabla (1x,y) = (2xy - \frac{1}{x^2}, x^2 - \frac{1}{y^2}) = (0,0)$$

 $f(x,y) = x^2y + \frac{1}{x} + \frac{1}{y}$

$$\begin{cases} 2xy - \frac{1}{x^2} = 0 \\ x^2 - \frac{1}{y^2} = 0 = 0 \end{cases} \quad x^2 = \frac{1}{y^2} = 0 \Rightarrow y^2 = \frac{1}{x^2} \Rightarrow y^2 = \frac{$$

$$2 \times \gamma - \frac{1}{x^2} = 2 \times \frac{1}{x^2} = 2 - \frac{1}{x^2} = 0 \Rightarrow \frac{1}{x^2} = 2 \Rightarrow x^2 = \frac{1}{2} \Rightarrow x = \pm \sqrt{\frac{1}{2}}$$

$$2xy - \frac{1}{x^2} = \frac{1}{x} 2x(-\frac{1}{x}) - \frac{1}{x^2} = -2 - \frac{1}{x^2} = 0 \Rightarrow \frac{1}{x^2} = -2 \Rightarrow x^2 = -\frac{1}{2} \Rightarrow \text{No tiens}$$

$$2 \times \gamma - \frac{1}{X^{2}} = \frac{1}{2} \times \frac{1}{X^{2}} = 2 - \frac{1}{X^{2}} = 0 \Rightarrow \frac{1}{X^{2}} = 2 \Rightarrow X^{2} = \frac{1}{2} \Rightarrow X = \pm \sqrt{\frac{1}{2}}$$

$$2 \times \gamma - \frac{1}{X^{2}} = \frac{1}{X^{2}} \times 2 \times (-\frac{1}{X}) - \frac{1}{X^{2}} = -2 - \frac{1}{X^{2}} = 0 \Rightarrow \frac{1}{X^{2}} = -2 \Rightarrow X^{2} = -\frac{1}{2} \Rightarrow \text{No tiens}$$

$$2 \times \gamma - \frac{1}{X^{2}} = \frac{1}{X^{2}} \times 2 \times (-\frac{1}{X}) - \frac{1}{X^{2}} = -2 - \frac{1}{X^{2}} = 0 \Rightarrow \frac{1}{X^{2}} = -2 \Rightarrow X^{2} = -\frac{1}{2} \Rightarrow \text{No tiens}$$

$$2 \times \gamma - \frac{1}{X^{2}} = \frac{1}{X^{2}} \times 2 \times (-\frac{1}{X}) - \frac{1}{X^{2}} = -2 - \frac{1}{X^{2}} = 0 \Rightarrow \frac{1}{X^{2}} = -2 \Rightarrow X^{2} = -\frac{1}{2} \Rightarrow \text{No tiens}$$

$$2 \times \gamma - \frac{1}{X^{2}} = \frac{1}{X^{2}} = -2 - \frac{1}{X^{2}} = 0 \Rightarrow \frac{1}{X^{2}} = -2 \Rightarrow X^{2} = -\frac{1}{2} \Rightarrow \text{No tiens}$$

$$2 \times \gamma - \frac{1}{X^{2}} = \frac{1}{X^{2}} = -2 \Rightarrow X^{2} = -\frac{1}{2} \Rightarrow X = \pm \sqrt{\frac{1}{2}} \Rightarrow X = \pm \sqrt{\frac{1}{$$

Estudiar los extremos relativos de la función f.

$$\nabla^2 | (x, y) = \begin{pmatrix} 2y + 2x^{-3} & 2x \\ 2x & 2y^{-3} \end{pmatrix}$$

$$H(1-\frac{1}{12},-\sqrt{2}) = \begin{vmatrix} 2\cdot (-\sqrt{2}) + 2(\frac{1}{12})^3 & 2(\frac{1}{12}) \\ 2(-\sqrt{2}) + 2(\frac{1}{12}) & 2\cdot (-\sqrt{2})^3 \end{vmatrix}$$

$$4P(\frac{1}{\sqrt{2}}, \sqrt{2}) = \begin{vmatrix} 2\sqrt{2} + 2(\frac{1}{\sqrt{2}}) & 2\frac{1}{\sqrt{2}} \\ 2\frac{1}{\sqrt{2}} & 2\sqrt{2} \end{vmatrix} =$$

Datos

$$f(x,y) = x^{2}y + \frac{1}{x} + \frac{1}{y}$$

$$\nabla f(x,y) = \left(2xy - \frac{1}{x^{2}}, x^{2} - \frac{1}{y^{2}}\right)$$
Puntos críticos:
$$(-1/\sqrt{2}, -\sqrt{2}) \vee (1/\sqrt{2}, \sqrt{2})$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2\cdot(-52)^{-3} \end{vmatrix} = \begin{vmatrix} -652 & -52 \\ -52 & -\frac{52}{2} \end{vmatrix} = \frac{6-2=4>0}{652<0}$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2\cdot(-52)^{-3} \end{vmatrix} = \begin{vmatrix} -652 & 52 \\ 52 & 52 \end{vmatrix} = \frac{6-2=4>0}{652<0}$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2(\frac{1}{15}) \end{vmatrix} = \begin{vmatrix} -652 & 52 \\ 52 & 52 \end{vmatrix} = \frac{6-2=4>0}{652>0}$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2(\frac{1}{15}) \end{vmatrix} = \begin{vmatrix} -652 & 52 \\ 52 & 52 \end{vmatrix} = \frac{6-2=4>0}{652>0}$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2(\frac{1}{15}) \end{vmatrix} = \begin{vmatrix} -652 & 52 \\ 52 & 52 \end{vmatrix} = \frac{6-2=4>0}{652>0}$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2(\frac{1}{15}) \end{vmatrix} = \begin{vmatrix} -652 & 52 \\ 52 & 52 \end{vmatrix} = \frac{6-2=4>0}{652>0}$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2(\frac{1}{15}) \end{vmatrix} = \begin{vmatrix} -652 & 52 \\ 52 & 52 \end{vmatrix} = \frac{6-2=4>0}{652>0}$$

$$H(1-\frac{1}{15},-52) = \begin{vmatrix} 2\cdot(52)+2(\frac{1}{15})^{3} & 2(\frac{1}{15}) \\ 2(\frac{1}{15}) & 2(\frac{1}{15}) \end{vmatrix} = \begin{vmatrix} -652 & 52 \\ 52 & 52 \end{vmatrix} = \frac{6-2=4>0}{652>0}$$

$$\left| \begin{array}{ccc} 6\sqrt{2} & \sqrt{2} \\ \sqrt{2} & \sqrt{2} \\ \end{array} \right| = 6 - 2 = 4 > 0 \\ \frac{d^2}{dx^2} = 6\sqrt{2} > 0$$