

(10.) $f(x,y) = 2xy - x^2y - xy^2 + 2$

$\nabla f = (2y - 2xy - y^2, 2x - x^2 - 2xy)$

$Hf = \begin{pmatrix} -2y & 2 - 2x - 2y \\ 2 - 2x - 2y & -2x \end{pmatrix}$

$|H| = 4xy - (2 - 2x - 2y)^2$

$|H(\frac{2}{3}, \frac{2}{3})| = 4 \frac{4}{9} - (2 - 2 \frac{2}{3} - 2 \frac{2}{3})^2$
 $= \frac{16}{9} - (2 - \frac{8}{3})^2 = \frac{16}{9} - (\frac{2}{3})^2 = \frac{12}{9} > 0$

\Rightarrow rel max or rel min.

$\frac{\partial^2 f}{\partial x^2} = -2y = -2 \frac{2}{3} < 0 \Rightarrow$ rel max

(a)