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

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

$$x - yx^{-1}$$

$$f_y = -\frac{1}{x}$$

$$f_x = 1 + yx^{-2} \qquad f_y = -x^{-1} \cdot y^0$$

$$f_{xx} = -2yx^{-3} \qquad f_{yy} = 0$$

$$f_{xy} = +x^{-2} \overset{?}{=} f_{yx} = x^{-2}$$

4) $f(x,y) = (1 + x^2 - 2y^2)^2$

$$f_x = 2(1 + x^2 - 2y^2) \cdot 2x = 4x + 4x^3 - 8xy^2$$

$$f_y = 2(1 + x^2 - 2y^2)(-4y) = -8y - 8yx^2 + 16y^3$$

$$f_{xx} = 4 + 12x^2 - 8y^2 = 4(1 + 3x^2 - 2y^2)$$

$$f_{yy} = -8 - 8x^2 + 48y^2$$

$$f_{xy} = -16xy$$