Problem.

Find the direction in which the function f=x^2-y^2+2xy decreases most rapidly at the point(1, 1).

Solution:

The function increases the fastest in the direction of gradient and decreases the fastest in the opposite direction. Hence the direction equals $-\nabla f(1,1) = -4\vec{\imath}$, as $-\nabla f = (-2x - 2y)\vec{\imath} + (2y - 2x)\vec{\jmath}$. Therefore the vector of the direction has coordinates $(-4,0)$.

Answer: $(-4,0)$**.**