Thm: If \( f : \mathbb{R}^n \rightarrow \mathbb{R}^m \) is differentiable at \( a \), then \( f \) is differentiable at \( a \).

Thm: Let \( f : \mathbb{R}^n \rightarrow \mathbb{R}^m \), \( f = (f_1, \ldots, f_m) \). \( f \) is differentiable at \( a \) iff \( f_i : \mathbb{R}^n \rightarrow \mathbb{R} \) is differentiable at \( a \) for all \( i = 1, \ldots, m \).

Thm: Let \( f : \mathbb{R}^n \rightarrow \mathbb{R}^m \), \( f = (f_1, \ldots, f_m) \). If \( \frac{\partial f_i}{\partial x_j} \) exists and are continuous in a neighborhood of \( a \) for all \( i, j \), then \( f \) is differentiable at \( a \).

Ex: Is \( f(x, y) = x^2 y \) differentiable at \((3, 1)\).

Find the equation of the tangent plane to \( f(x, y) = x^2 y \) at \((3, 1)\).

Estimate \( f(3.1, .9) \)