Useful Thms:

1. (A way to know if f is diff'ble at $\bar{a}$)

   Sps $f: \mathbb{R}^n \to \mathbb{R}^m$. Sps that $\frac{\partial f_i}{\partial x_j}$ exists and

   is <u>continuous</u> at $\bar{a}$ for all i, j. Then

   f is differentiable at $\bar{a}$.

   Note: existence of $\frac{\partial f_i}{\partial x_j}$ is not enough for diff'ble.

   $\hookleftarrow$ see earlier example

   $f: \mathbb{R}^2 \to \mathbb{R}$.

2. $f: \mathbb{R}^n \to \mathbb{R}^m$ is diff'ble at $\bar{a}$ if and only if each

   component function of f is diff'ble at $\bar{a}$.

3. f diff'ble at $\bar{a}$ $\Rightarrow$ f continuous at $\bar{a}$

   (but not vice versa).