

Exercise Twelve: The cases and array Environments

In a linear algebra course, we learn that the determinant of a 2×2 matrix is computed in the following way.

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

Here's an interesting function. It's continuous *only* at $x = 0$.

$$f(x) = \begin{cases} x, & \text{if } x \in \mathbb{Q} \\ -x, & \text{if } x \in \mathbb{R} - \mathbb{Q} \end{cases}$$

And here's a function whose mixed partials (f_{xy} and f_{yx}) are not equal at $(0, 0)$.

$$f(x, y) = \begin{cases} \frac{xy^3 - yx^3}{x^2 + y^2}, & \text{if } (x, y) \neq (0, 0) \\ 0, & \text{if } (x, y) = (0, 0) \end{cases}$$