

Use a small whiteboard to represent the tangent plane to the graph of a function of 2 variables. A small change in position in the domain corresponds to a diagonal line in the tangent plane, representing df . To get from one end to the other, one can first proceed a distance dx in the x direction, then a distance dy in the y direction, with corresponding changes to f . This triangle can be drawn on the whiteboard. These changes can be represented as the slope in the corresponding direction, multiplied by the distance, that is, as $\frac{\partial f}{\partial x}dx$, and similarly for y . The change df in f is of course the sum of these two changes in the coordinate directions, leading to the multivariable chain rule in differential form, namely

$$df = \frac{\partial f}{\partial x} dx + \frac{\partial f}{\partial y} dy$$