Lecture 18
Differentiable functions

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Mathematics 2 – Calculus of Functions of Several Variables
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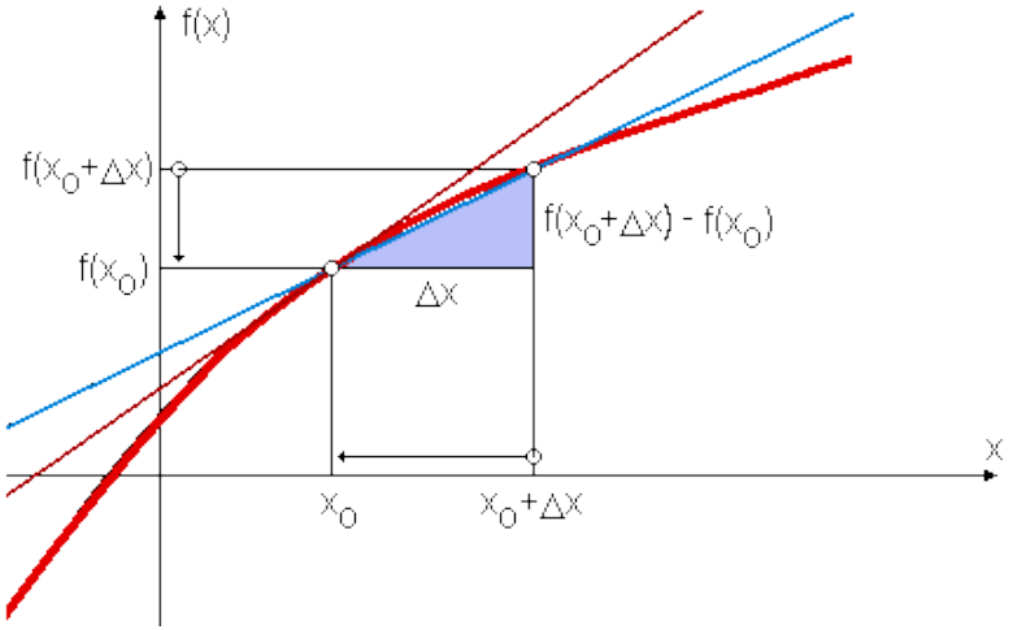
Derivative of function of one variable

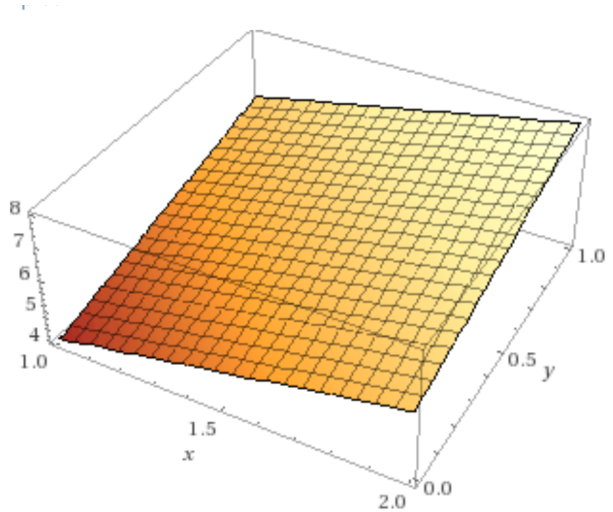


The tangent line at point $(x_0, f(x_0))$ to the graph of function f:

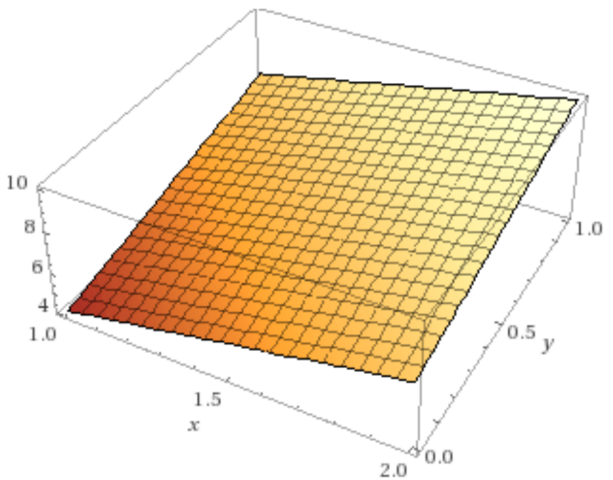
$$g(x) = f(x_0) + m(x - x_0)$$

where $m = f'(x_0)$.

Plane in $\mathbb{R}^2$



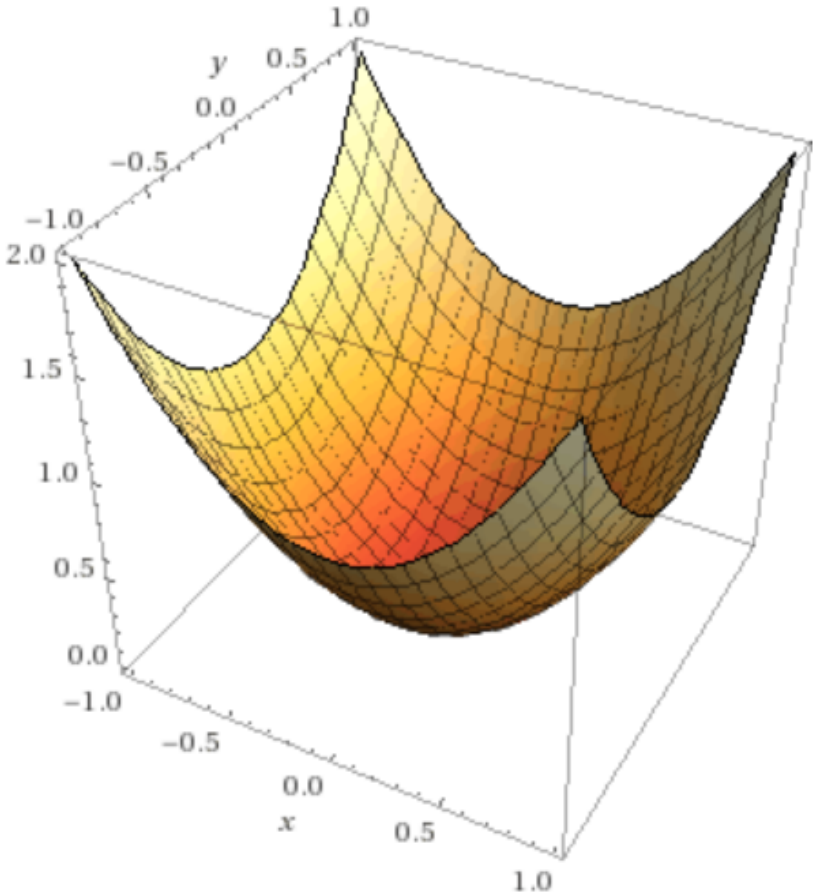
$$y = a + v \cdot (x - x_0) = 4 + 2 \cdot (x_1 - 1) + 2 \cdot (x_2 - 0)$$



$$y = a + v \cdot (x - x_0) = 4 + 4 \cdot (x_1 - 1) + 4 \cdot (x_2 - 0)$$

Tangent plane to the graph of function on $\mathbb{R}^2$

$$f(x, y) = x^2 + y^2$$

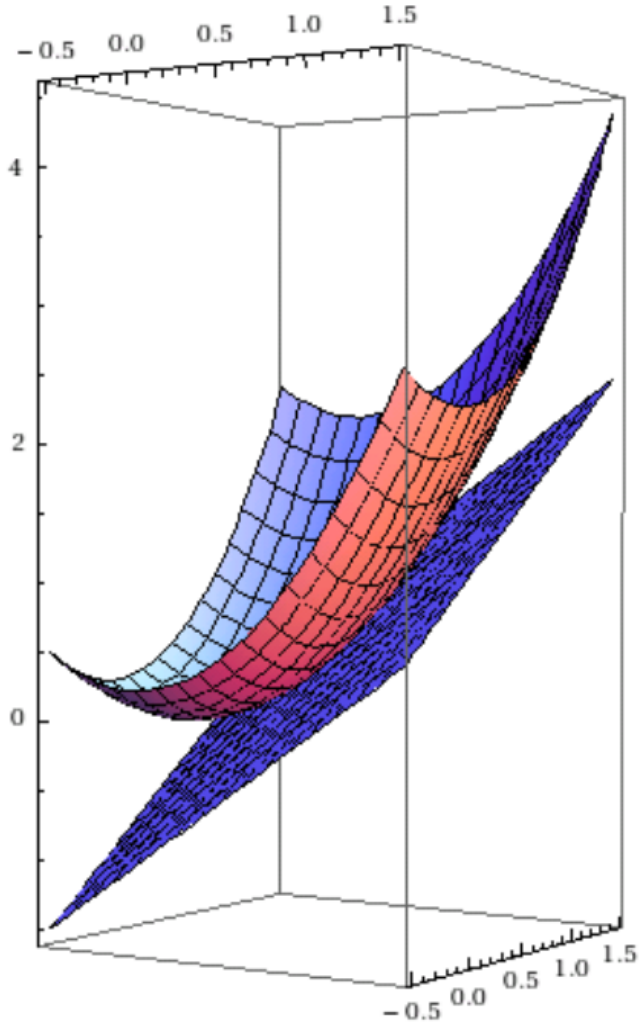


Tangent plane to the graph of function on $\mathbb{R}^2$

$$f(x,y) = x^2 + y^2$$

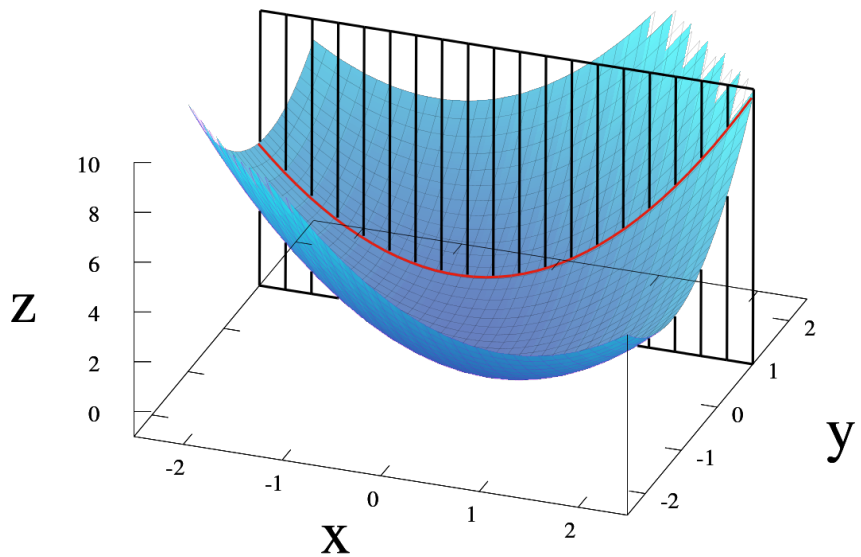
$$g(x,y) = x + y - \frac{1}{2}$$

– tangent plane at $(x_0, y_0) = \left(\frac{1}{2}, \frac{1}{2}\right)$



Partial derivatives

$$f(x, y) = x^2 + xy + y^2$$



Wikipedia

Here $y = 1$ is fixed

Non-differentiability

$$f(x,y) = \frac{xy}{x^2+y^2}$$