Honors Multivariable Calculus : : Class 07

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1 Differentiation

Definition 1. The single variable definition

$$f'(a) = \frac{\mathrm{d}f}{\mathrm{d}x}_a = \lim_{h\to 0} \frac{f(a+h) - f(a)}{h}$$

Attempt a definition where $f : \mathbb{R}^n \to \mathbb{R}^m$, here,

$$f'(\vec{a}) = \lim_{h\to 0} \frac{f(\vec{a}+\vec{h}) - f(\vec{a})}{\vec{h}}$$

How tf do we divide with a vector? This can't work come on! Sensible one can be

$$f'(\vec{a}) = \lim_{h\to 0} \frac{f(\vec{a}+\vec{h}) - f(\vec{a})}{|\vec{h}|}$$