The Derivative Graph and its Applications

Brian Guenter[1]

[1]Thesda Institute

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Using the template

To use this template,

- import it at the beginning of your presentation like this: `#import "@preview/clean-math-presentation:0.1.0": *`
- import touying by `#import "@preview/touying:0.5.3": *`
- call the `#show: clean-math-presentation-theme.with()` function to set the title, authors, and other information of your presentation.

The title slide can be created with the `#title-slide()` command. You can pass a `background` (an image or `none`) and up to two logos `logo1` and `logo2`.
The outline can be included, e.g., with `#components.adaptive-columns(outline(title: none))`.
Normal slides can be created with `#slide()`.
A lot of general documentation about the Touying package can be found in the Touying documentation. The general typst documentation is also helpful.

The Chain Rule

The chain rule for a multidimensional function:

$$\frac{\partial f\Big(g_1(x_1, \ldots x_n), g_2(x_1 \ldots x_n), \ldots g_{m(x_1,\ldots,x_n)}\Big)}{\partial x_i} = \sum_{j=1}^{m} \left(\frac{\partial f}{\partial g_j}\right) \frac{\partial g_j}{\partial x_i}$$

Breadth first evaluation example:

$$g_1(x, y) = yx^2$$
$$g_2(x, y) = xy^2$$
$$f(g_1(x, y), g_2(x, y)) = g_1(x, y) g_2(x, y)$$

$$\frac{\partial f}{\partial(x)} = \frac{\partial f}{\partial g_1} \frac{\partial g_1(x, y)}{\partial x} + \frac{\partial f}{\partial g_2}(\partial g_2(x, y))$$
$$= \frac{\partial f}{\partial g_1} \frac{\partial yx^2}{\partial x} + \frac{\partial f}{\partial g_2}(\partial g_2(x, y))$$

The Chain Rule

Depth first evaluation:

$$f(g_1(x,y), g_2(x,y)) = f(yx^2, xy^2)$$

$$\frac{\partial f}{\partial(x)} = \frac{\partial f}{\partial g_1}\frac{\partial g_1(x,y)}{\partial x} + \frac{\partial f}{\partial g_2}\frac{\partial g_2(x,y)}{\partial x}$$

Theorems can be created with the `#theorem` command. Similarly, there are `#proof`, `#definition`, `#example`, `#lemma`, and `#corollary`.
For example, here is a theorem:

Theorem (Important one)

Using theorems is easy.

Proof. This was very easy, wasn't it? □

A definition already given by well-known mathematicians [1] is:

The Chain Rule

Definition (Important stuff)

Important stuff is defined as the stuff that is important to me:

$$\exp(\mathrm{i}\pi) + 1 = 0.$$

Equations

Equations with a label with a label will be numbered automatically:

$$\int_0^\infty \exp(-x^2)\,\mathrm{d}x = \frac{\pi}{2} \tag{1}$$

We can then refer to this equation as (1). Equations without a label will not be numbered:

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$

Inline math equations will not break across lines, which can be seen here:
$ax^2 + bx + c = 0 \Rightarrow x_{1,2} = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$

References

[1] I. Author, “The definition of importance,” *Journal on Important Stuff*, 1978.