Research Methods in IT

Report

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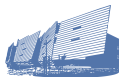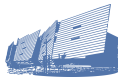
Mathematics

Theorem (Fermat's little theorem)

For a prime p and $a \in \mathbb{Z}$ it holds that $a^p \equiv a$ (mod p).

Proof.

The invertible elements in a field form a group under multiplication. In particular, the elements

$$1, 2, \ldots, p - 1 \in \mathbb{Z}_p$$

form a group under multiplication modulo p. This is a group of order $p - 1$. For $a \in \mathbb{Z}_p$ and $a \neq 0$ we thus get $a^{p-1} = 1 \in \mathbb{Z}_p$. The claim follows. ∎
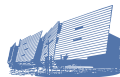
Mathematics

Example

The function $\varphi\colon \mathbb{R} \to \mathbb{R}$ given by $\varphi(x) = 2x$ is continuous at the point $x = \alpha$, because if $\epsilon > 0$ and $x \in \mathbb{R}$ is such that $|x - \alpha| < \delta = \frac{\epsilon}{2}$, then

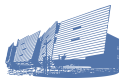$$|\varphi(x) - \varphi(\alpha)| = 2|x - \alpha| < 2\delta = \epsilon.$$

Highlighting

Highlighting

Sometimes it is useful to highlight certain words in the text.

> **Important message**
>
> If a lot of text should be highlighted, it is a good idea to put it in a box.
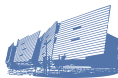
It is easy to match the colour theme.

Lists

- Bullet lists are marked with a red box.

1. Numbered lists are marked with a white number inside a red box.

Description highlights important words with red text.

Items in numbered lists like 1 can be referenced with a red box.

Example

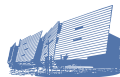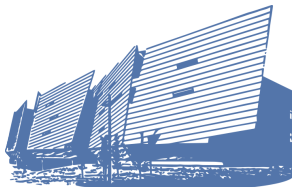- Lists change colour after the environment.

Effects

1 Effects that control
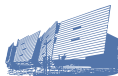
Use textblock for arbitrary placement of objects.

Effects

1 Effects that control
2 when text is displayed

Use **textblock** for arbitrary placement of objects.

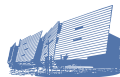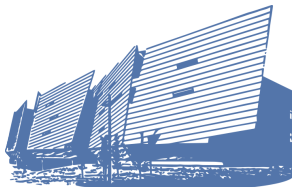### Theorem

This theorem is only visible on slide number 2.

Effects

1. Effects that control
2. when text is displayed
3. are specified with <> and a list of slides.

Use **textblock** for arbitrary placement of objects.

Effects

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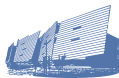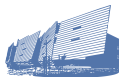
Use **textblock** for arbitrary placement of objects.

It creates a box with the specified width (here in a percentage of the slide's width) and upper left corner at the specified coordinate (x, y) (here x is a percentage of width and y a percentage of height).

References I

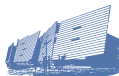📕 Hartshorne, R.
Algebraic Geometry.
Springer-Verlag, 1977.

📄 Helsø, M.
'Rational quartic symmetroids'.
Adv. Geom., 20(1):71–89, 2020.

🌐 Helsø, M. and Ranestad, K.
Rational quartic spectrahedra, 2018.
https://arxiv.org/abs/1810.11235

► Atiyah, M. and Macdonald, I.
Introduction to commutative algebra.
Addison-Wesley Publishing Co., Reading, Mass.-London-Don Mills,
Ont., 1969

References II

[5] Artin, M.
'On isolated rational singularities of surfaces'.
Amer. J. Math., 80(1):129–136, 1966.