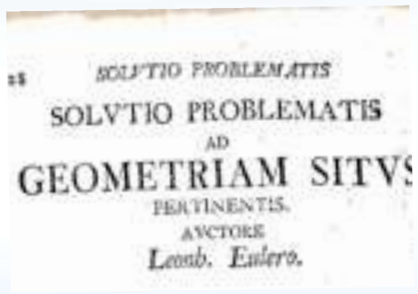
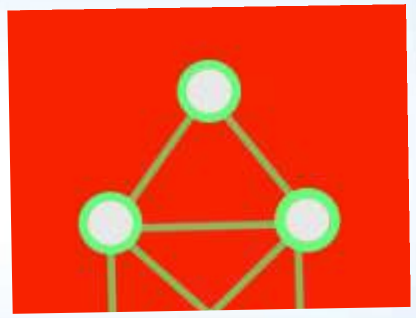


SOLVTIO PROBLEMATIS

SOLVTIO PROBLEMATIS
AD
GEOMETRIAM SITVS
PERTINENTIS.
AVCTORE
Leonh. Eulero.



Kapitel 2: Graphen

Algorithmen und Datenstrukturen
WS 2021/22

Prof. Dr. Sándor Fekete

Konzentration

2.1 Historie: Ein Mathematiker geht spazieren

Carl Friedrich Gauß (1777-1855)

1 + 2 + 3 + … + 100
100 + 99 + 98 + … + 1

101 + 101 + 101 + … + 101

= 100 x 101

Also:

1+2+3+…+100 = 5050

Gaußsche Summenformel

Die **Gaußsche Summenformel** (nicht zu verwechseln mit einer Gaußschen Summe), auch **kleiner Gauß** genannt, ist eine Formel für die Summe der ersten n aufeinanderfolgenden natürlichen Zahlen:

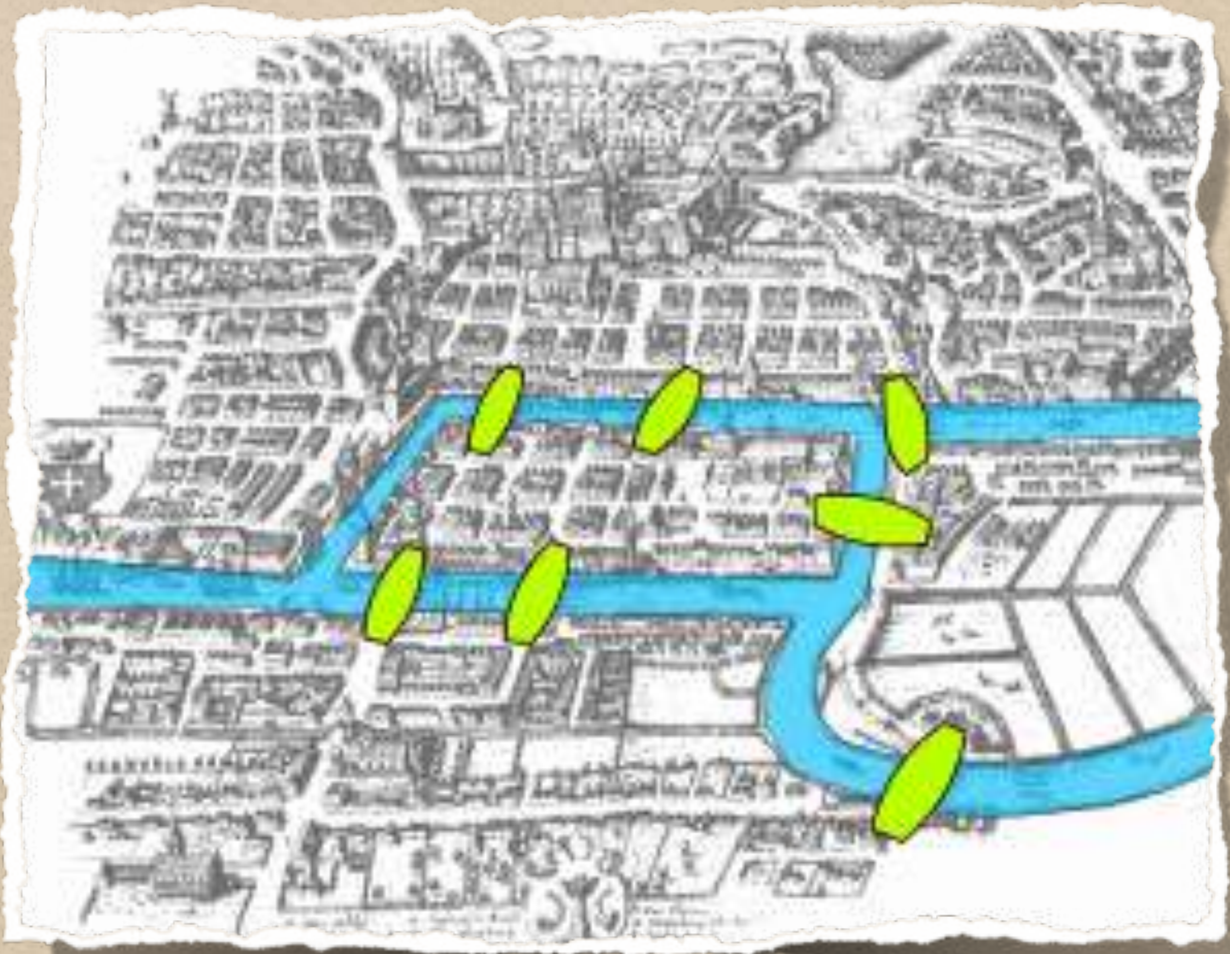
$$1+2+3+4+\cdots+n=\sum_{k=1}^{n} k=\frac{n(n+1)}{2}=\frac{n^2+n}{2}$$

2.1 Historie: Ein Mathematiker geht spazieren

Leonhard Euler (1707-1783)

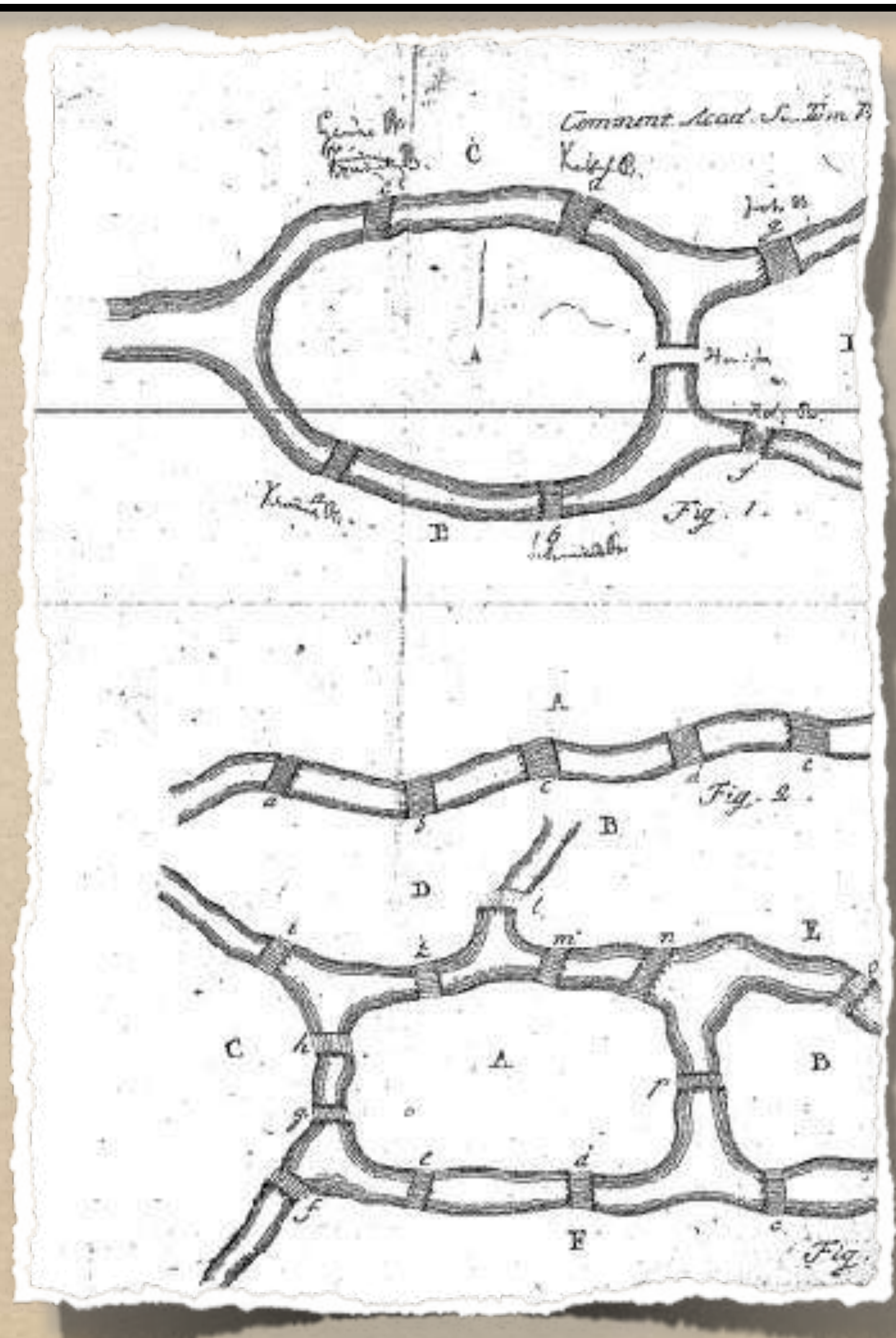
2.1 Historie: Ein Mathematiker geht spazieren

2.1 Historie: Ein Mathematiker geht spazieren

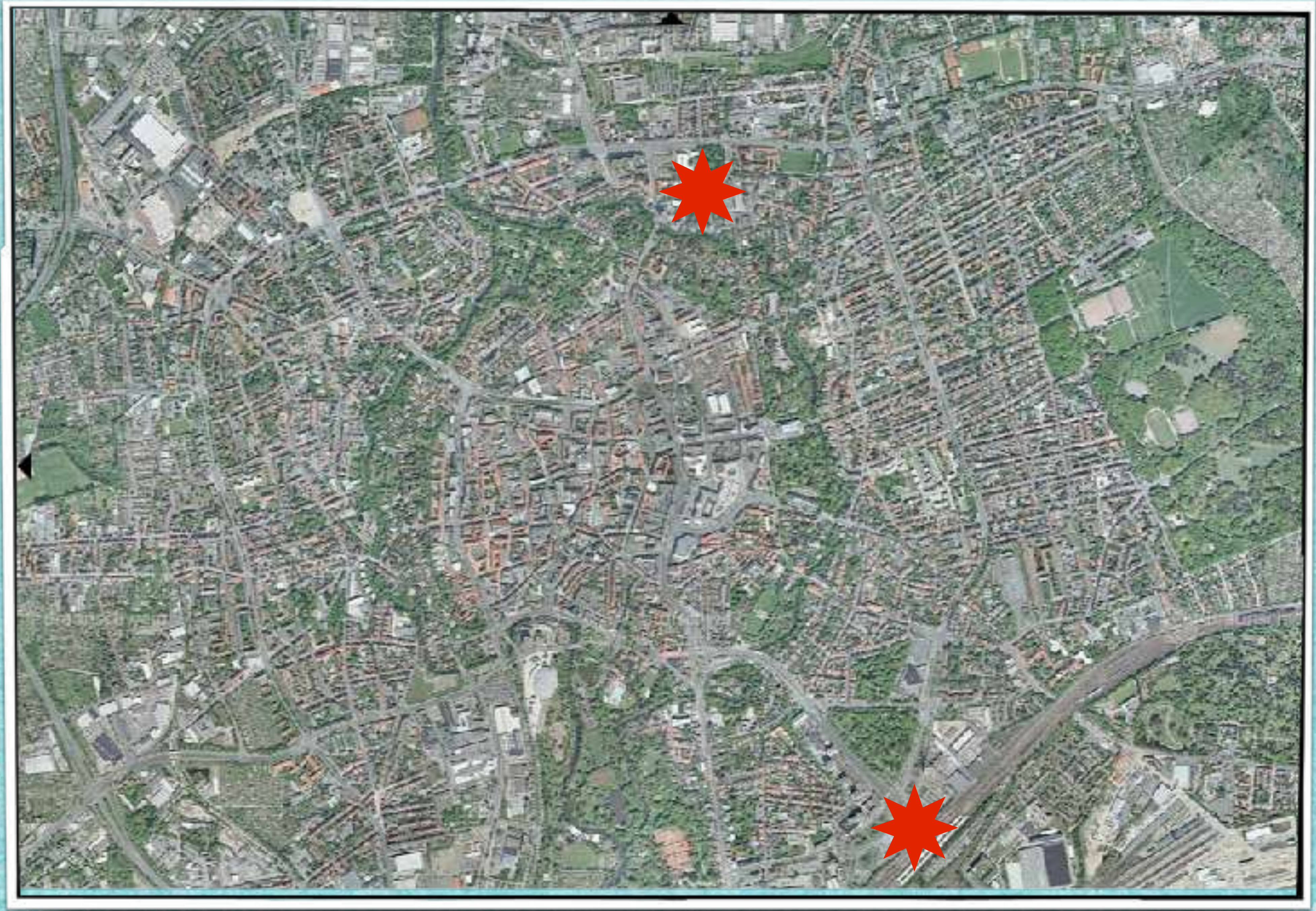


Königsberg und seine 7 Brücken

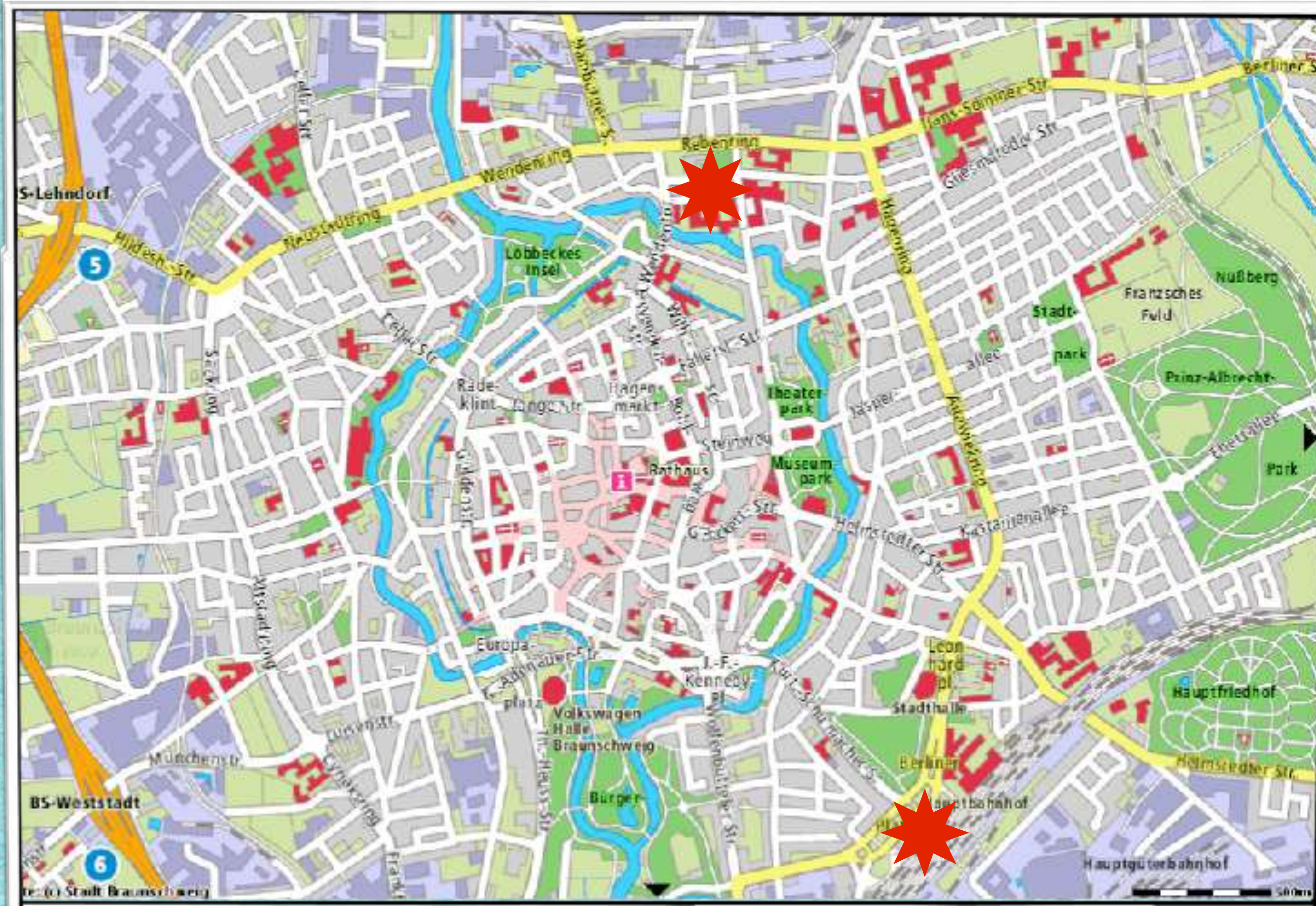
2.1 Historie: Ein Mathematiker geht spazieren



Wie kommt man zur TU?

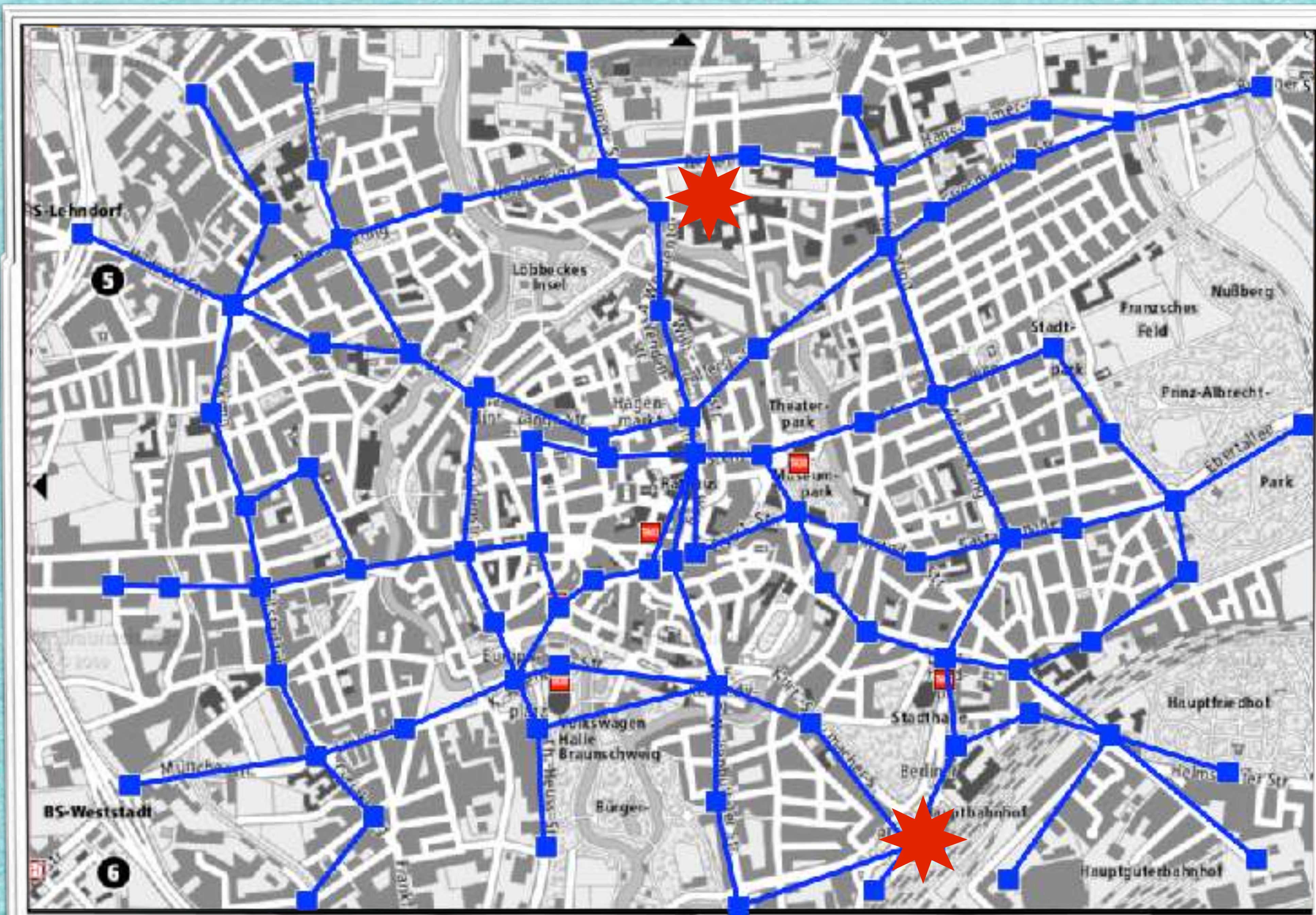


Wie kommt man zur TU?

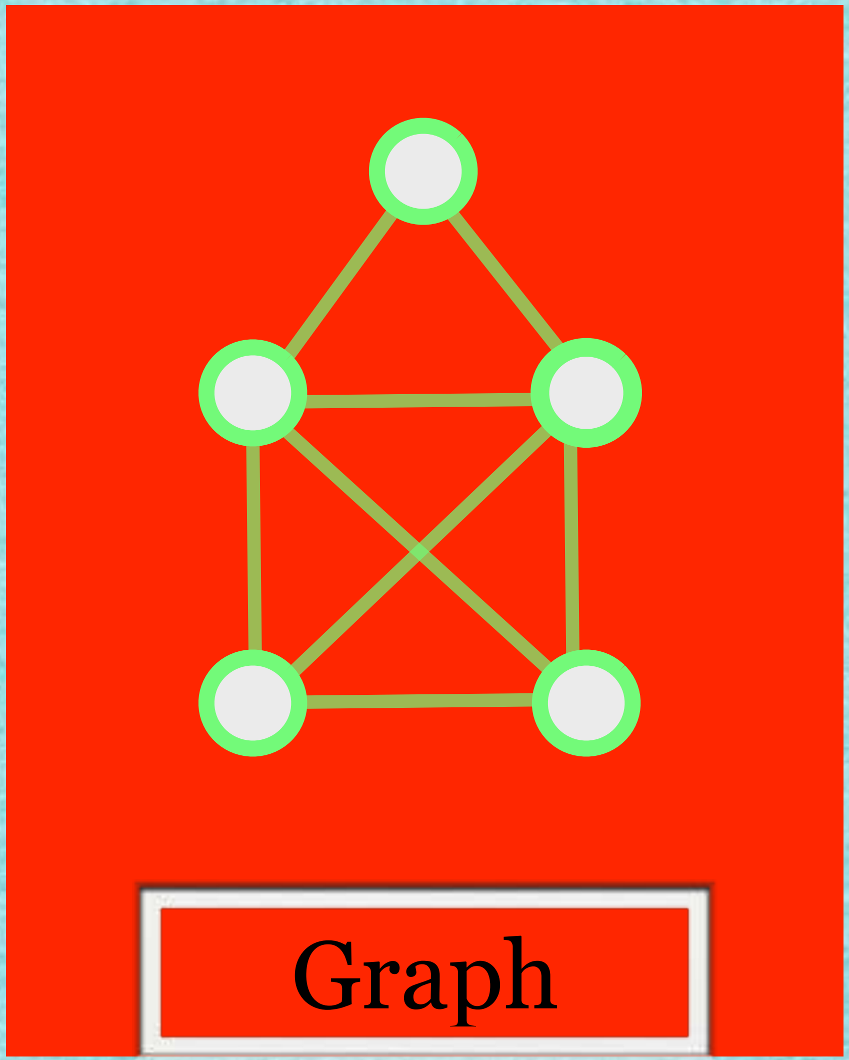


Wie kommt man zur TU?

Wie kommt man zur TU?



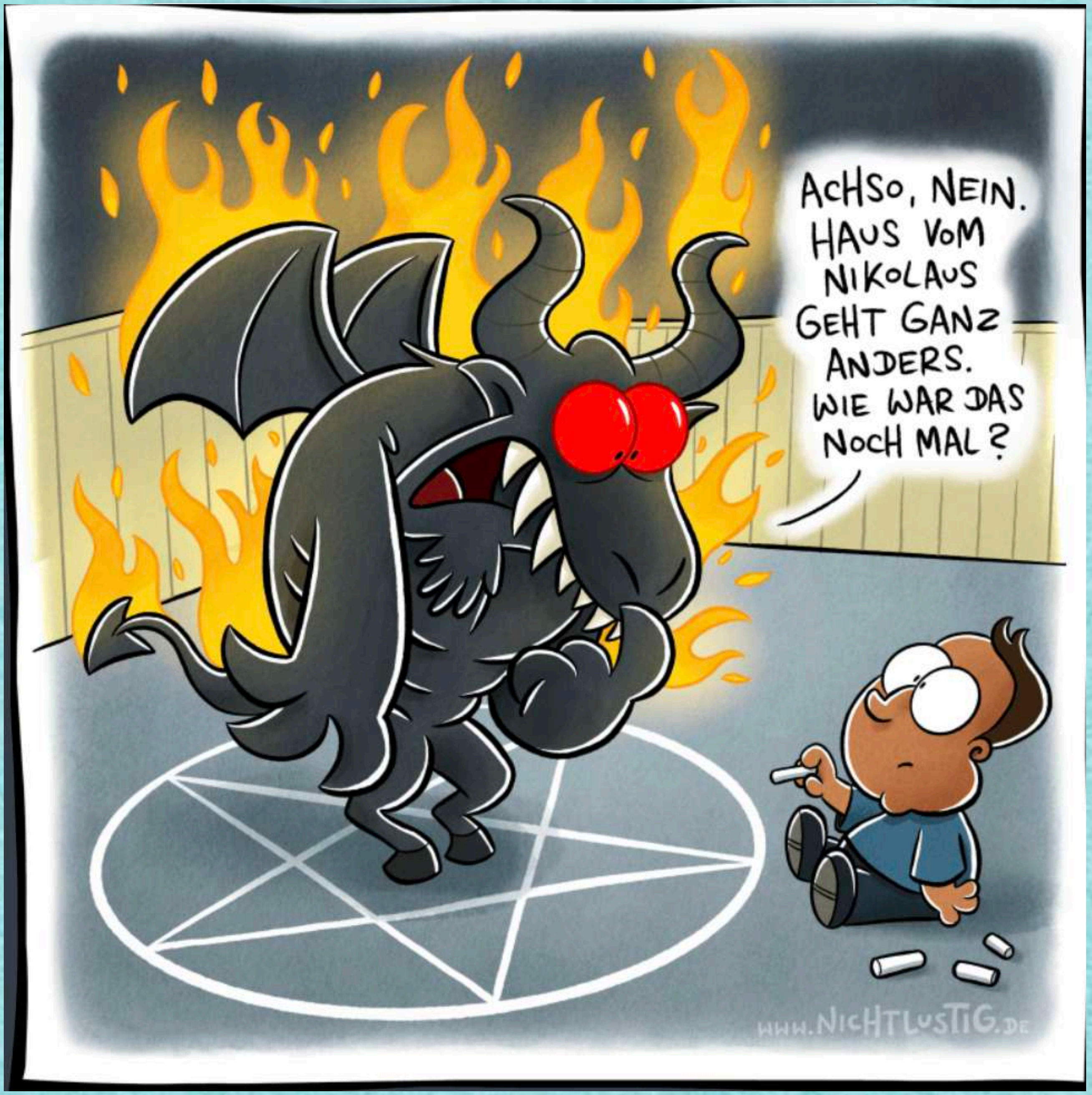
Gestatten, Graph!



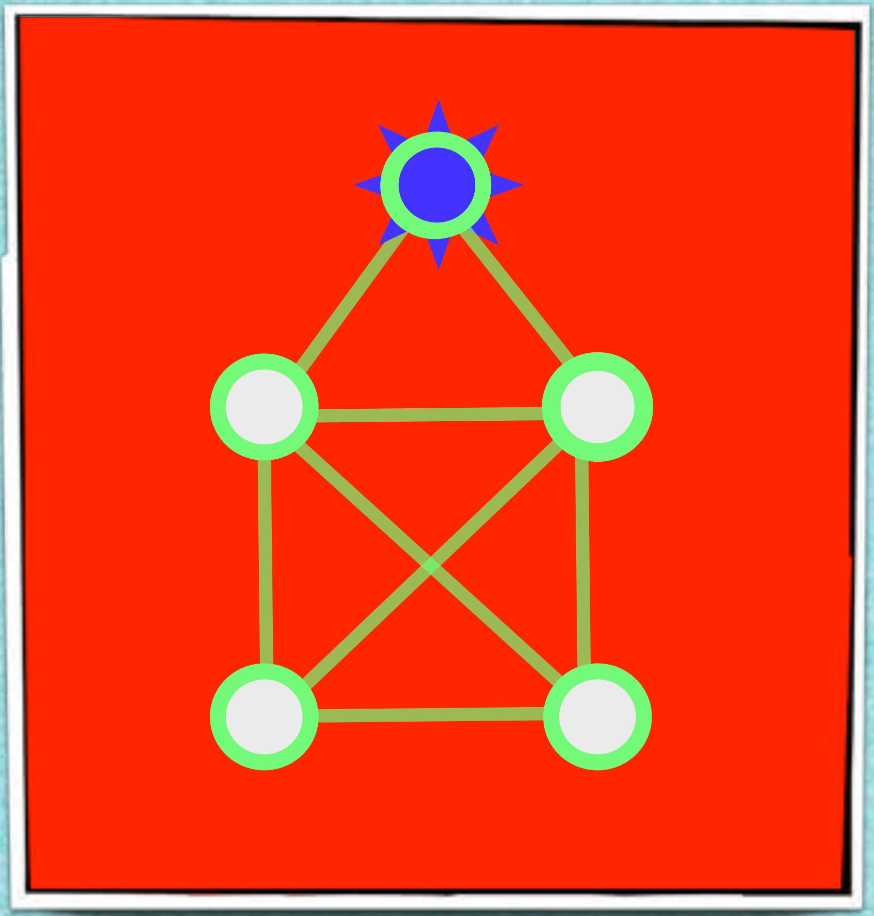
Graph: Ein Gebilde aus Knoten (Haltestellen) und Kanten (Verbindungen)

Das Haus des Nikolaus

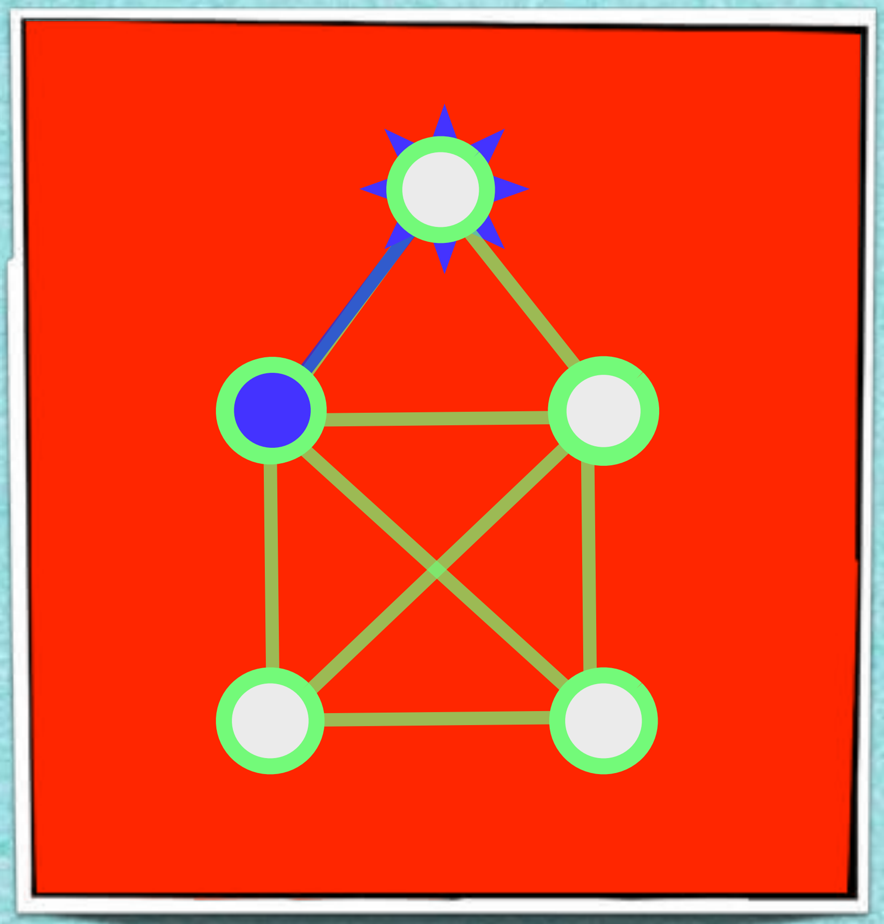
Das Haus des Nikolaus



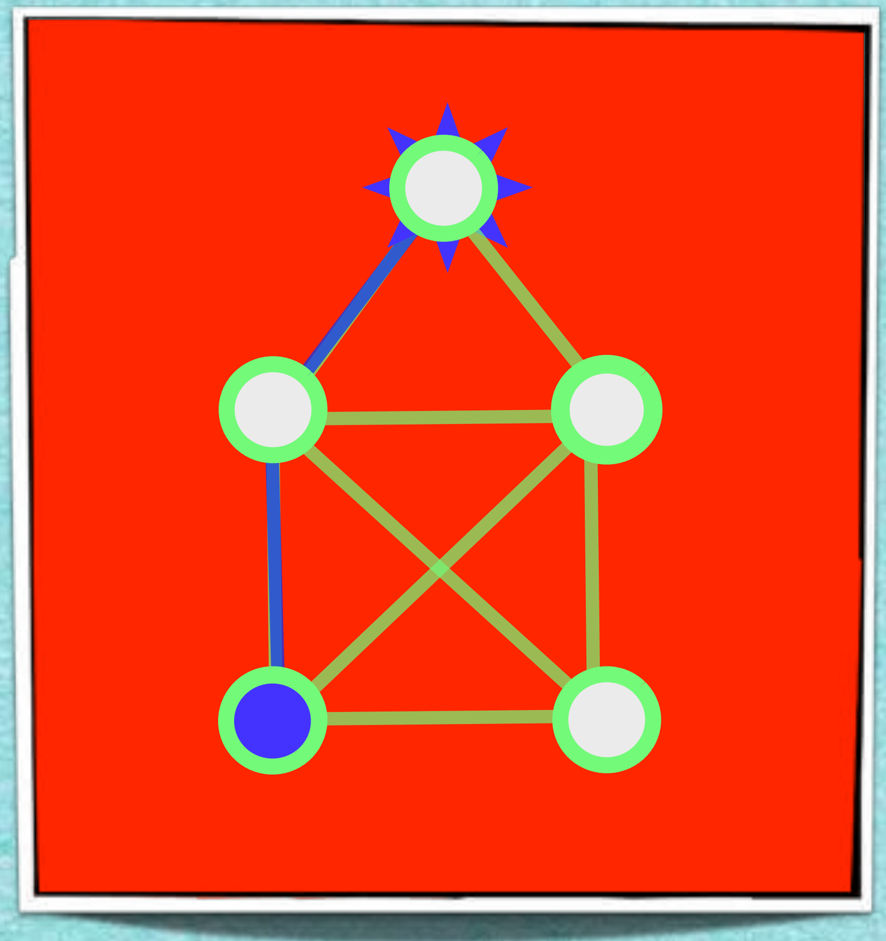
Das Haus des Nikolaus



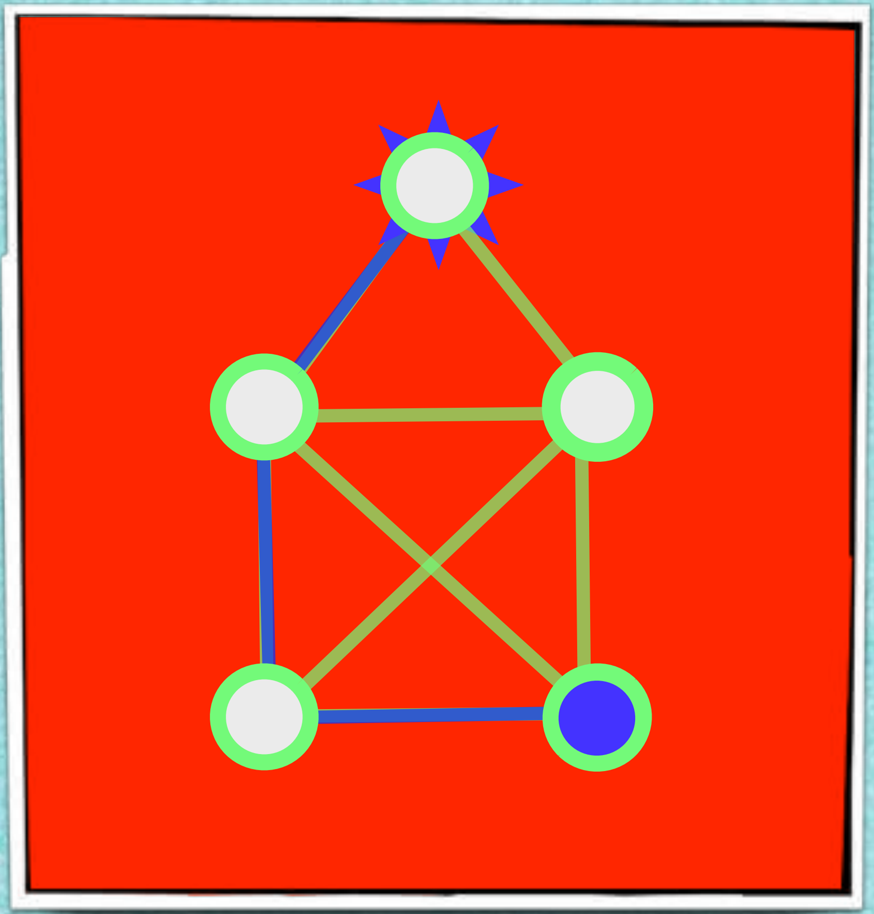
Das Haus des Nikolaus



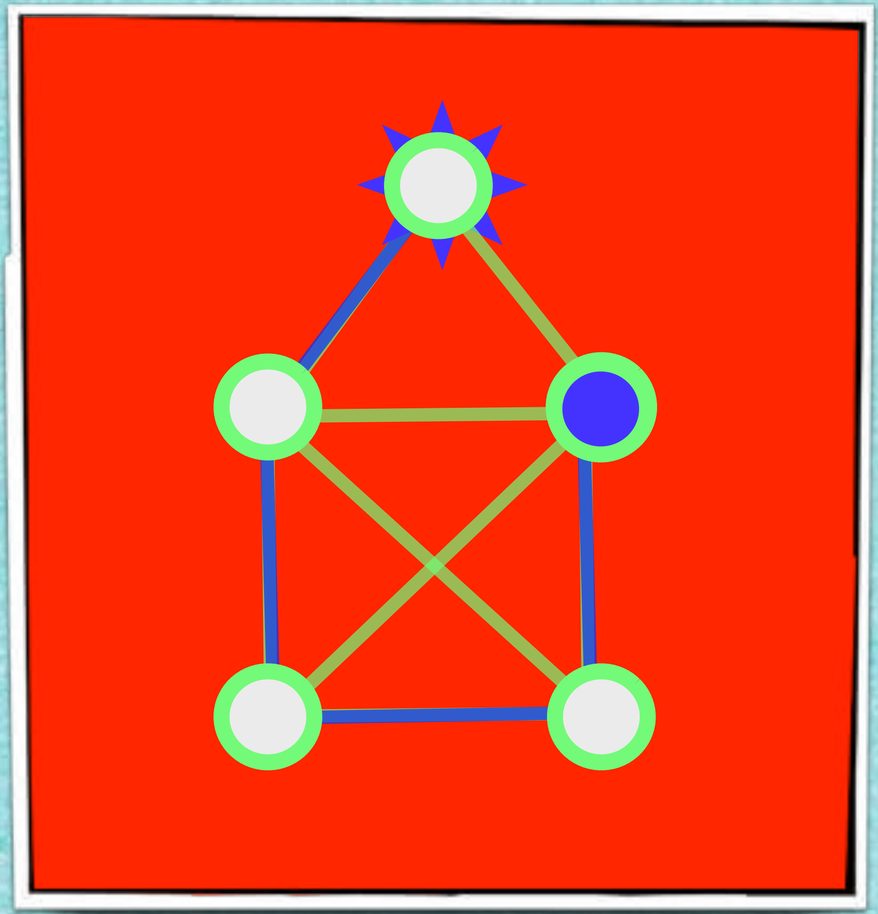
Das Haus des Nikolaus



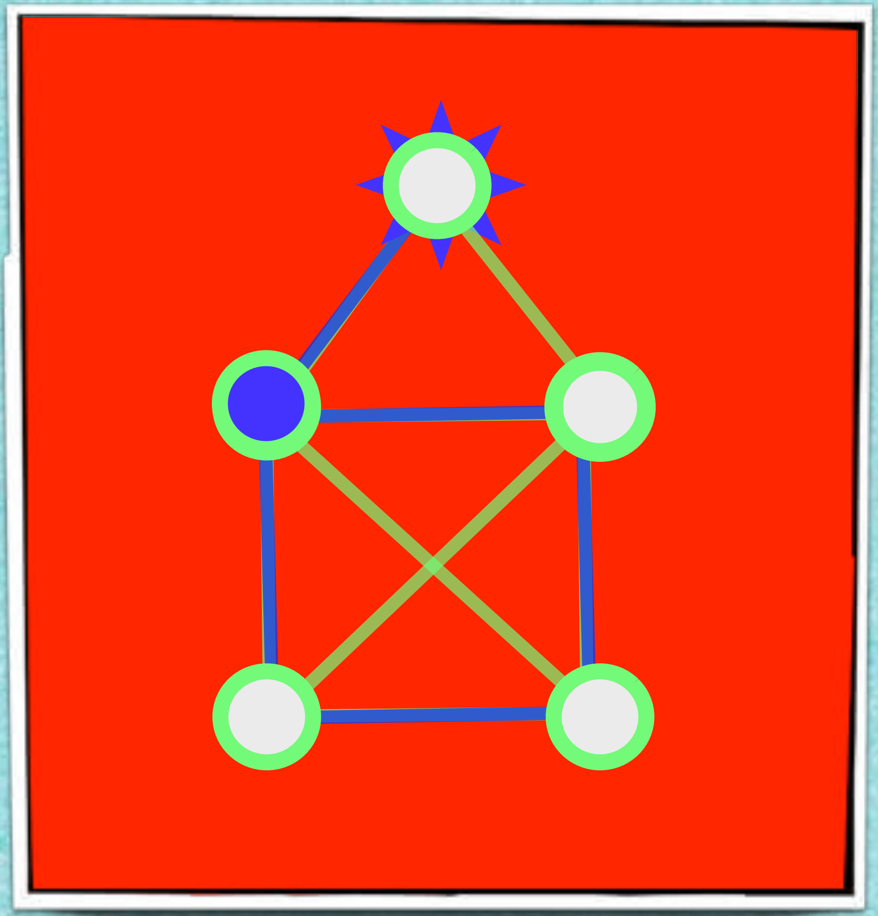
Das Haus des Nikolaus



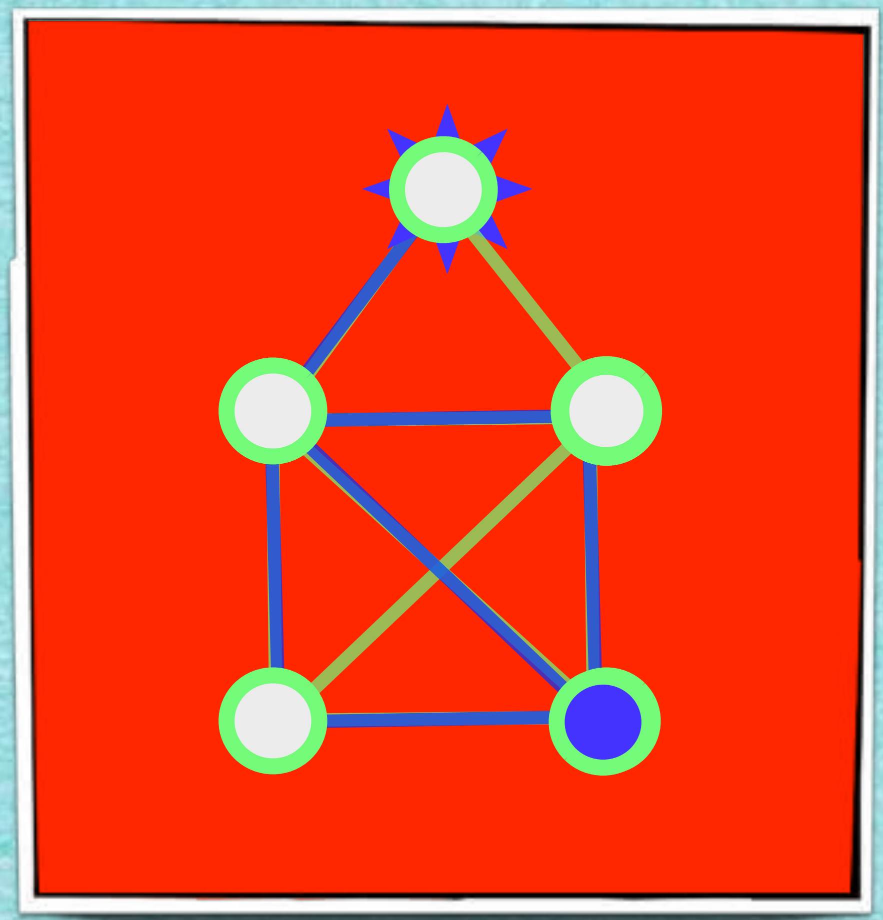
Das Haus des Nikolaus



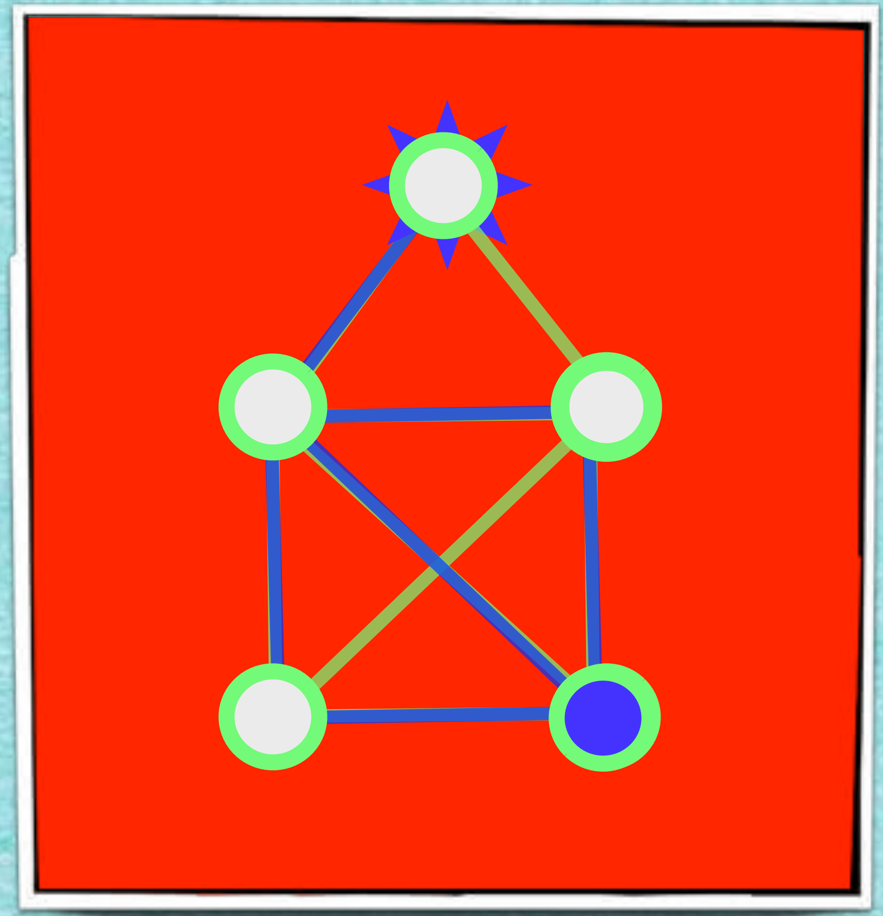
Das Haus des Nikolaus



Das Haus des Nikolaus



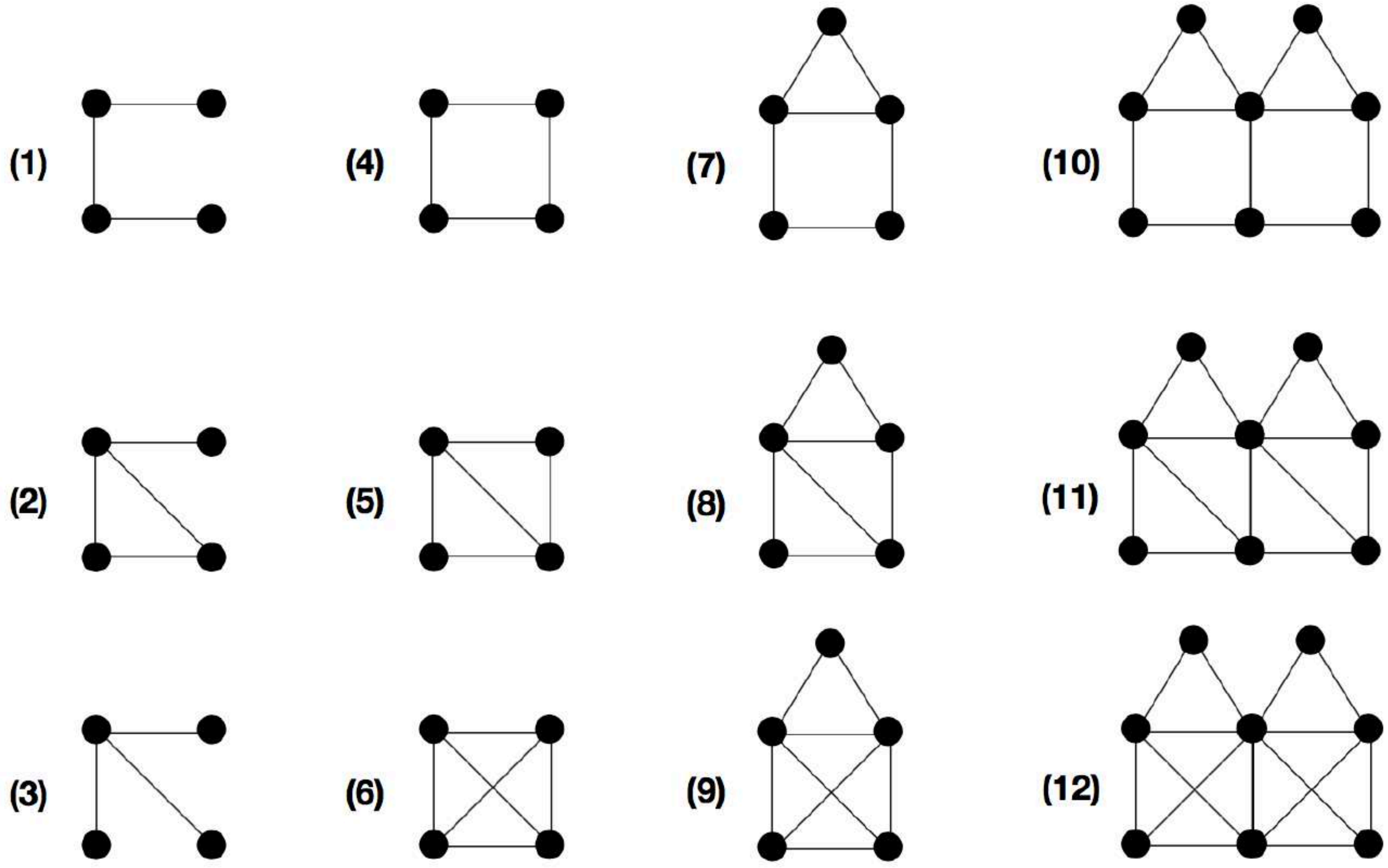
Das Haus des Nikolaus



Klappt so nicht...

Herausforderung !

Welche Graphen kannst Du in einem Zug nachzeichnen, ohne den Stift abzusetzen?
(Wenn ja, wo kann man anfangen oder aufhören?)



Herausforderung !

App Store Vorschau

One touch Drawing 4+

Ecapyc Inc.

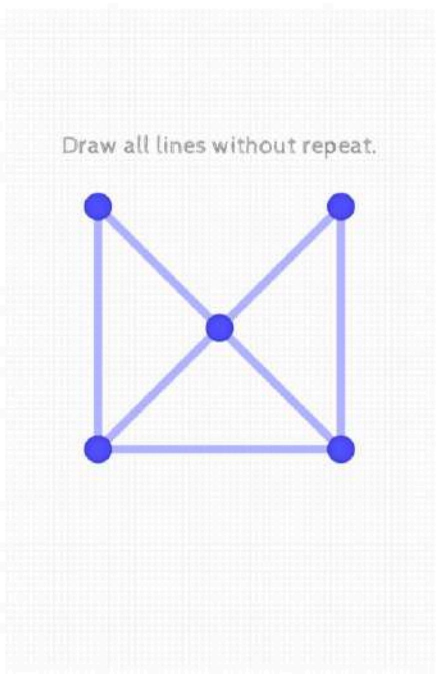
★★★★★ 4,5 • 50 Bewertungen

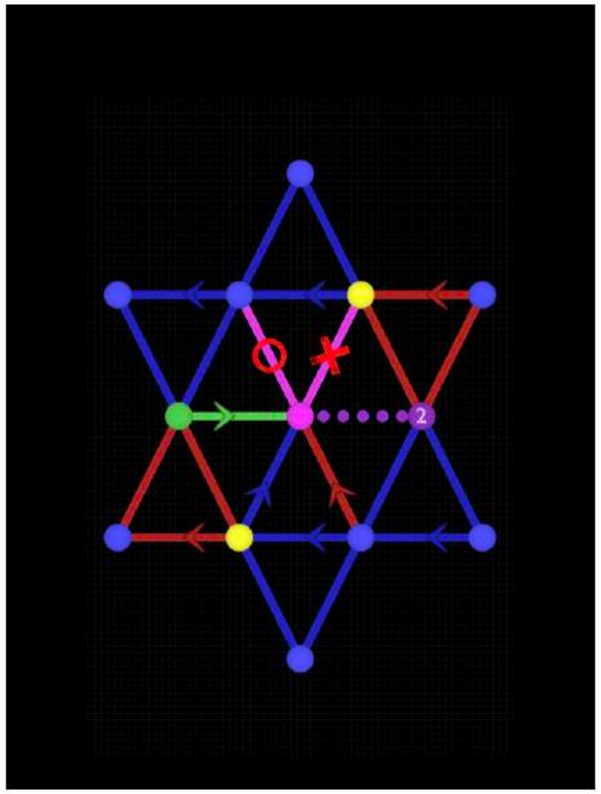
Gratis · In-App-Käufe möglich

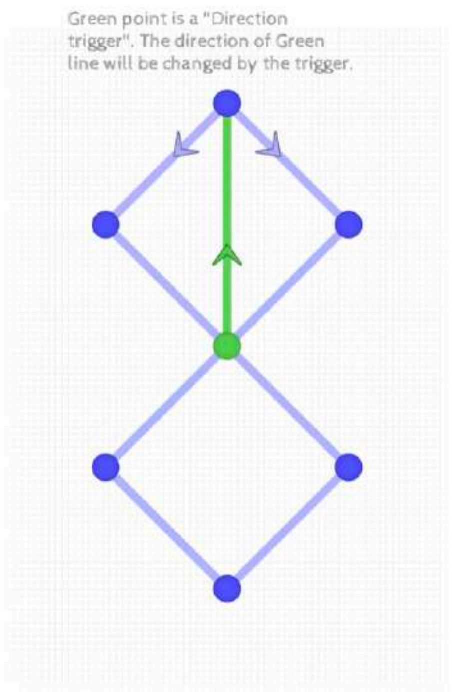
Anzeigen in: Mac App Store ↗

Screenshots

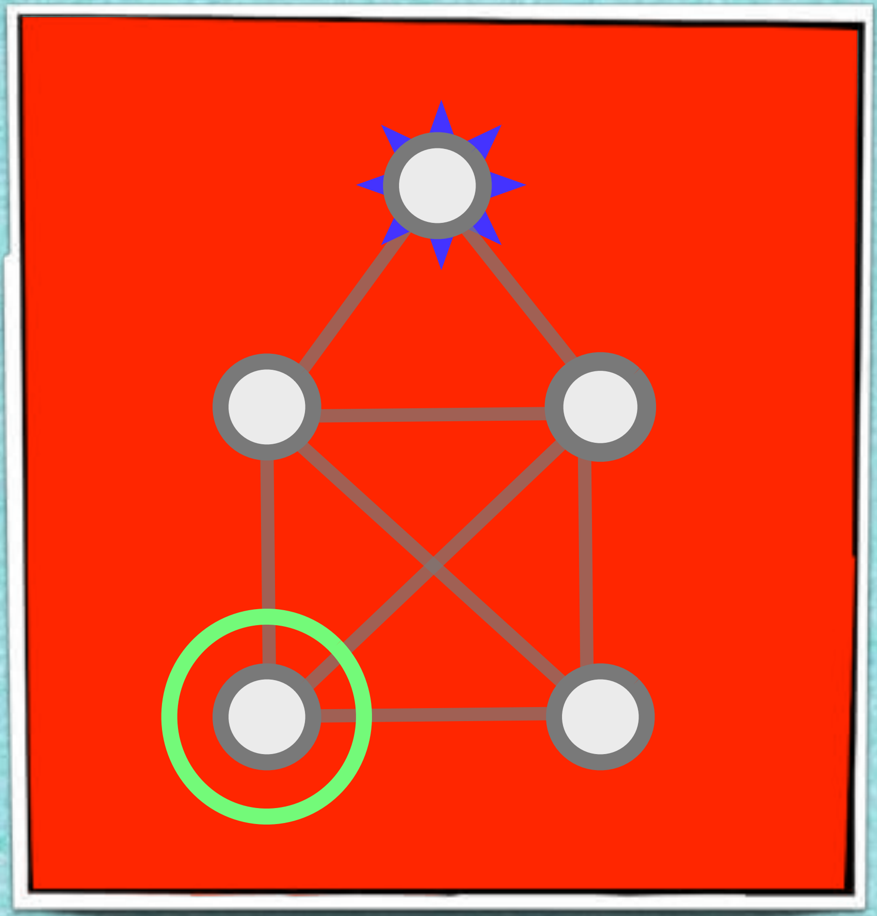
iPad iPhone



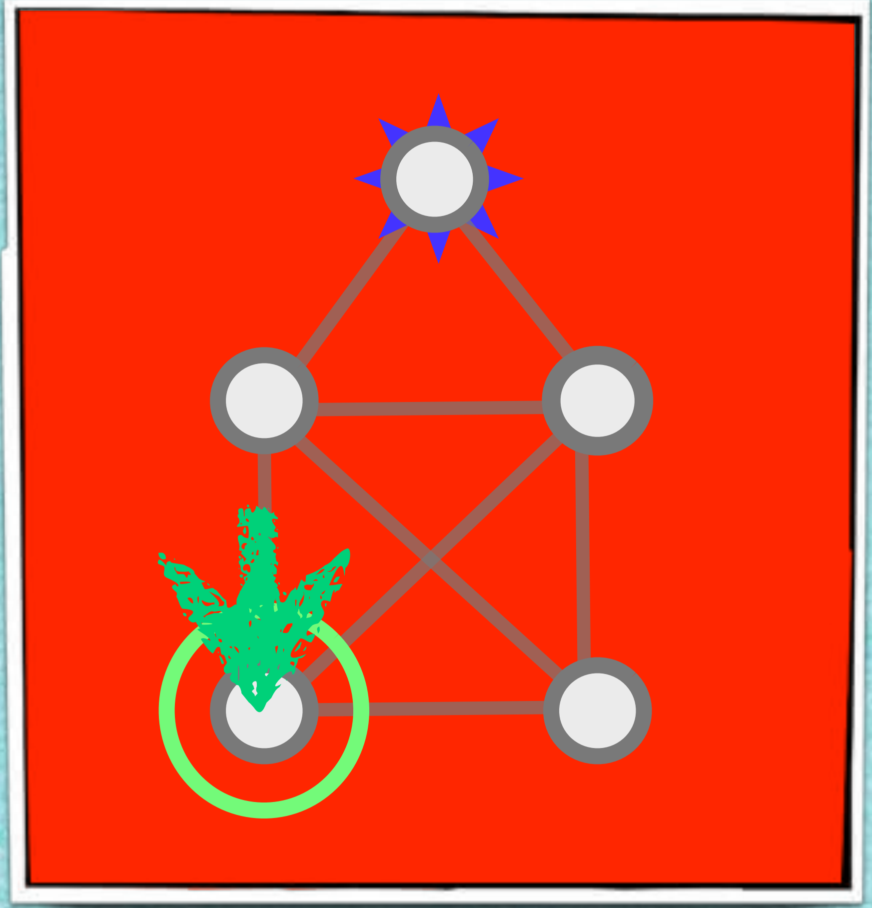




Das Haus des Nikolaus



Das Haus des Nikolaus



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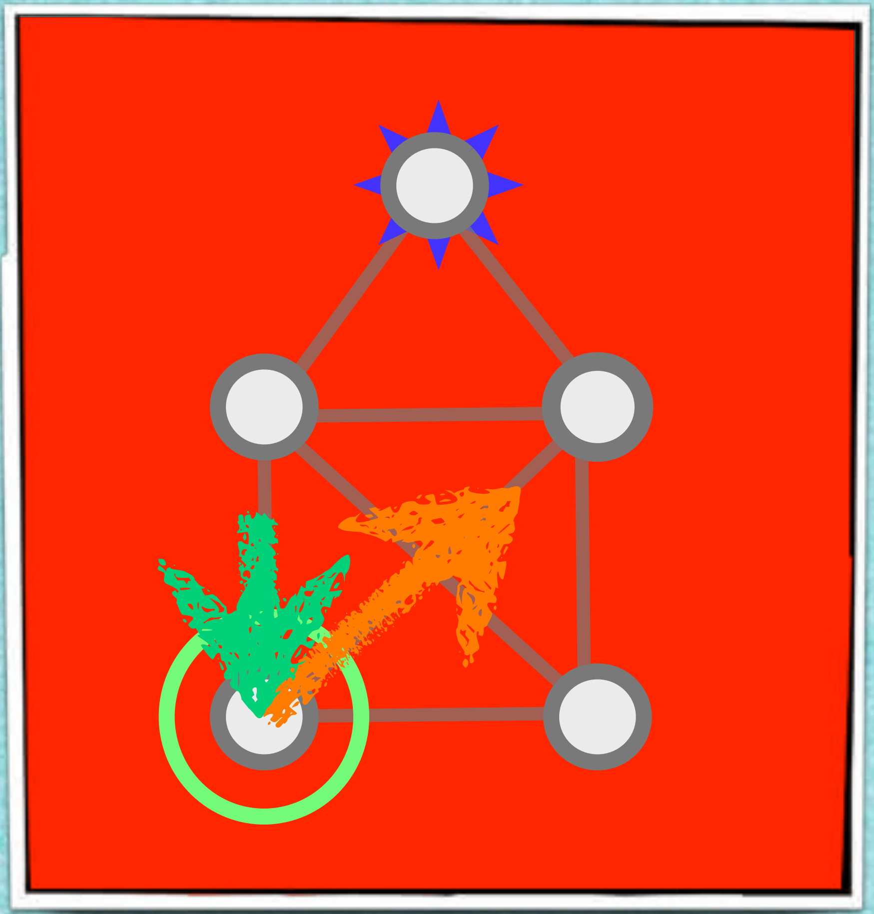
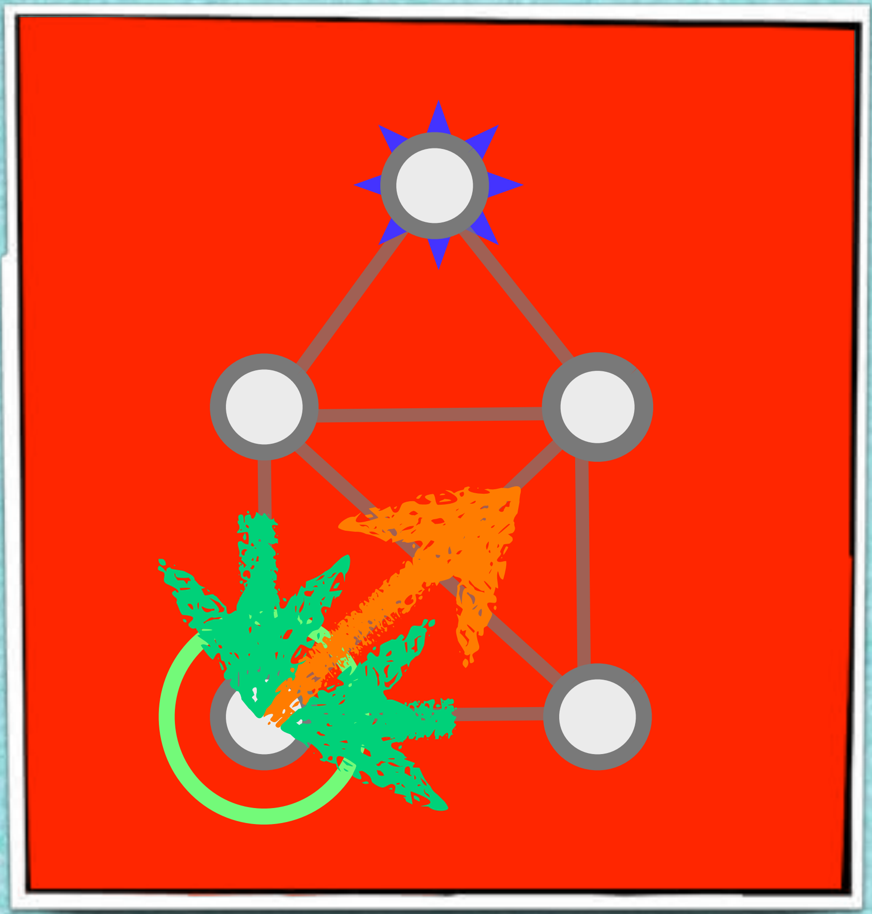
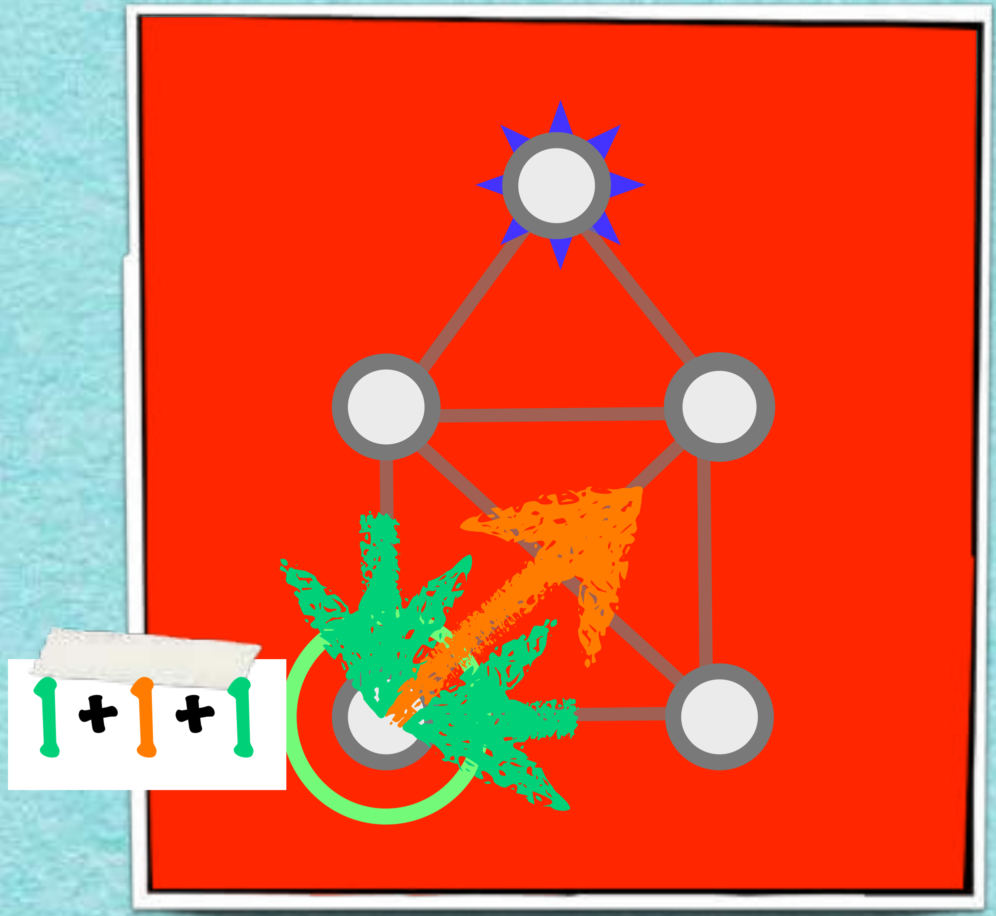


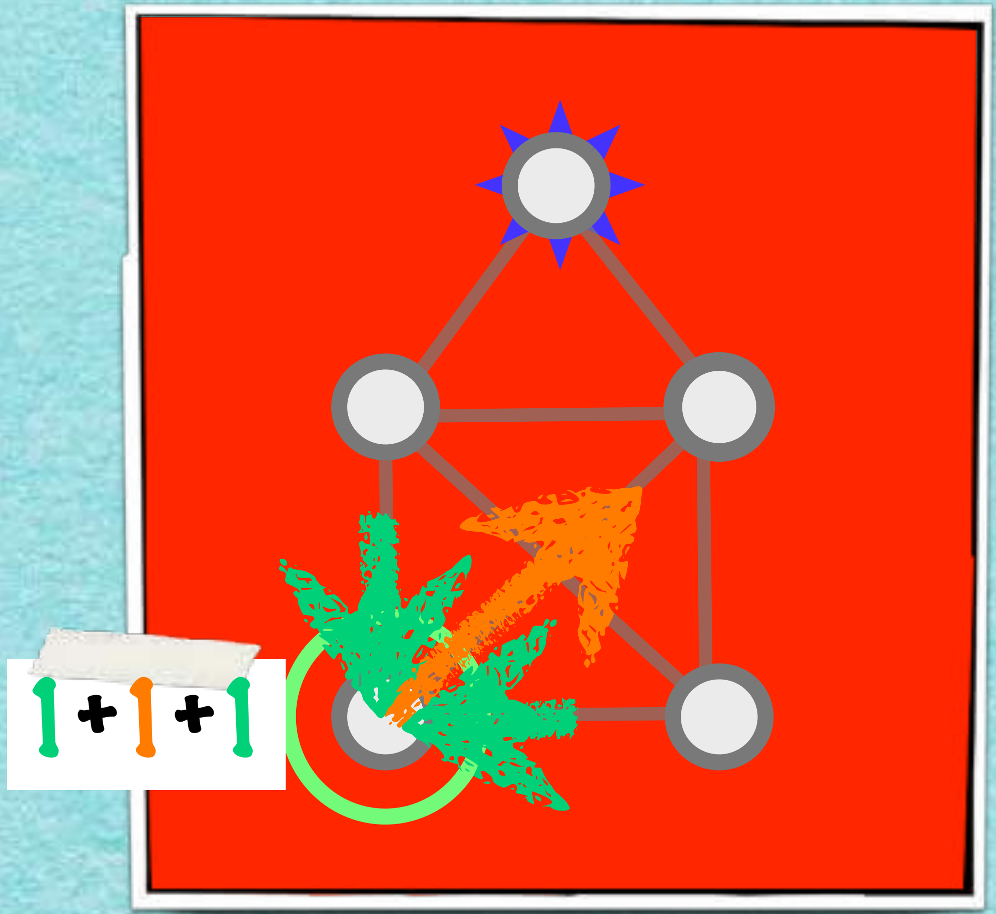
Das Haus des Nikolaus



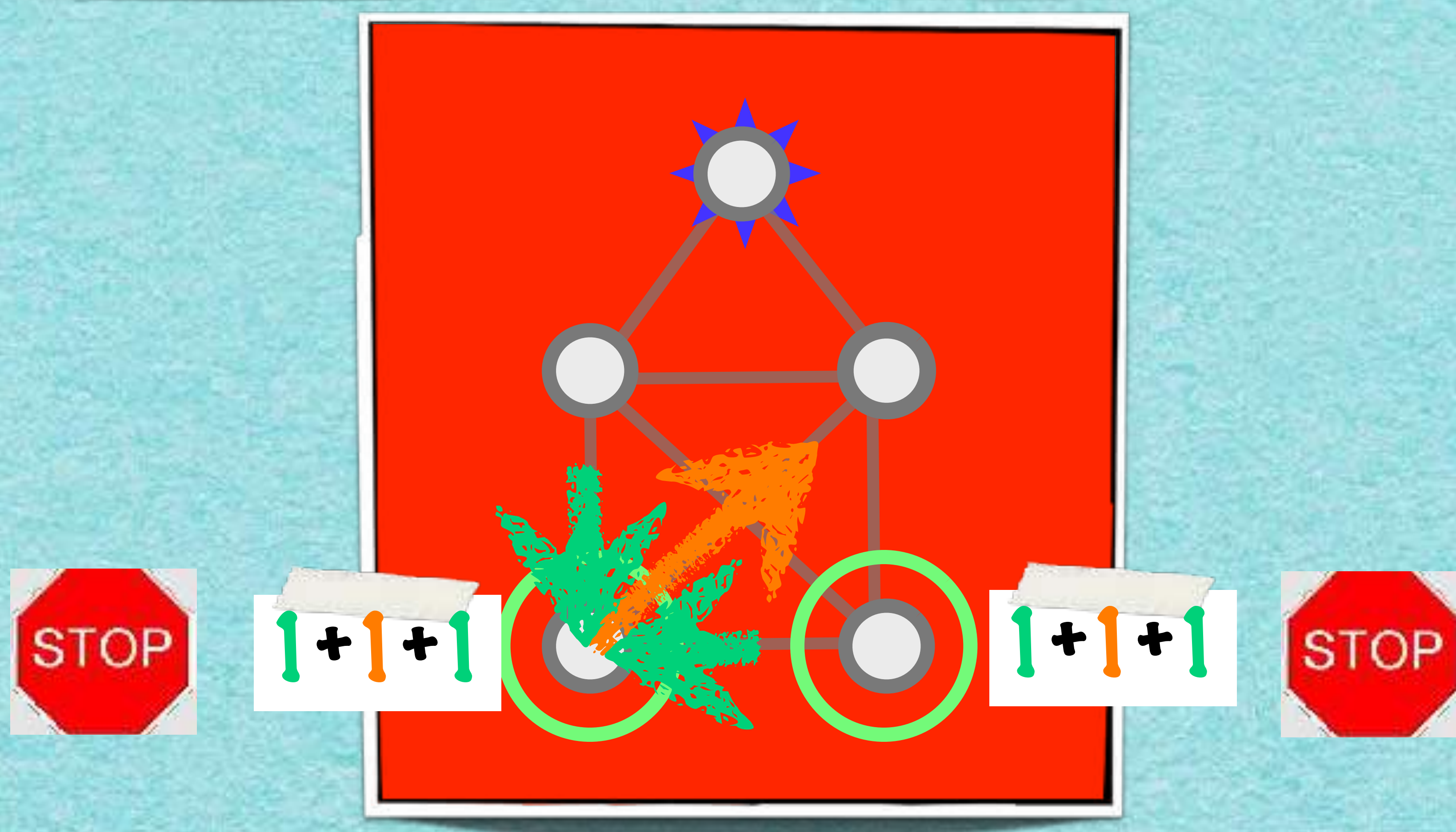
Das Haus des Nikolaus



Das Haus des Nikolaus

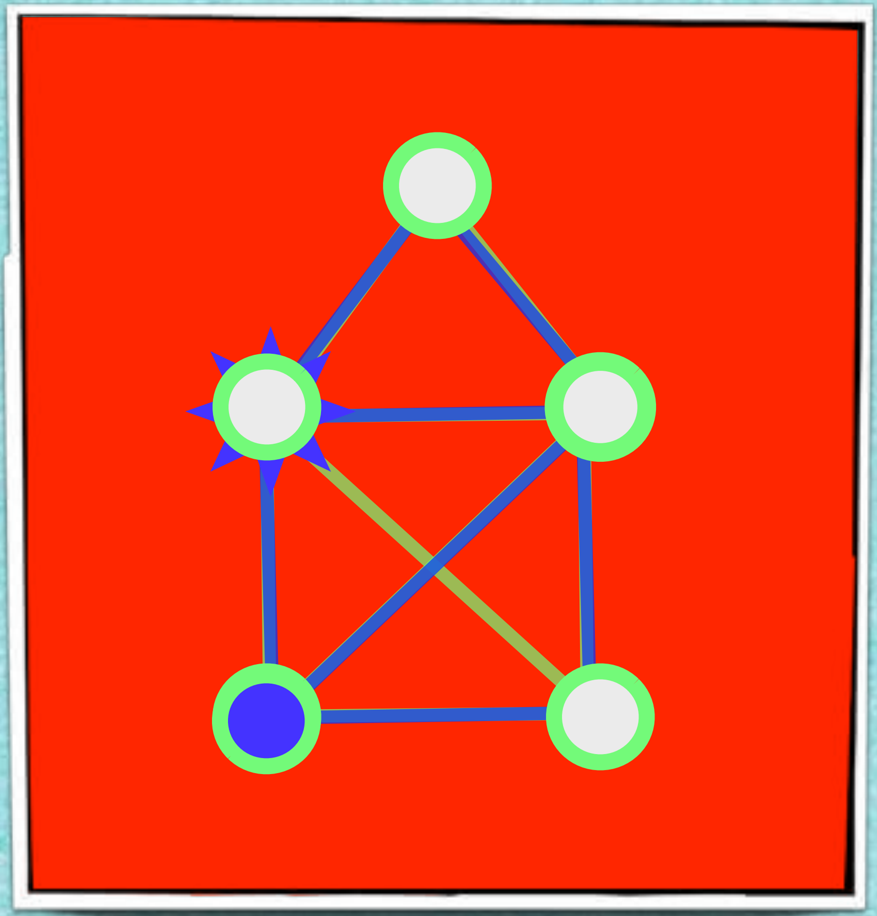


Das Haus des Nikolaus



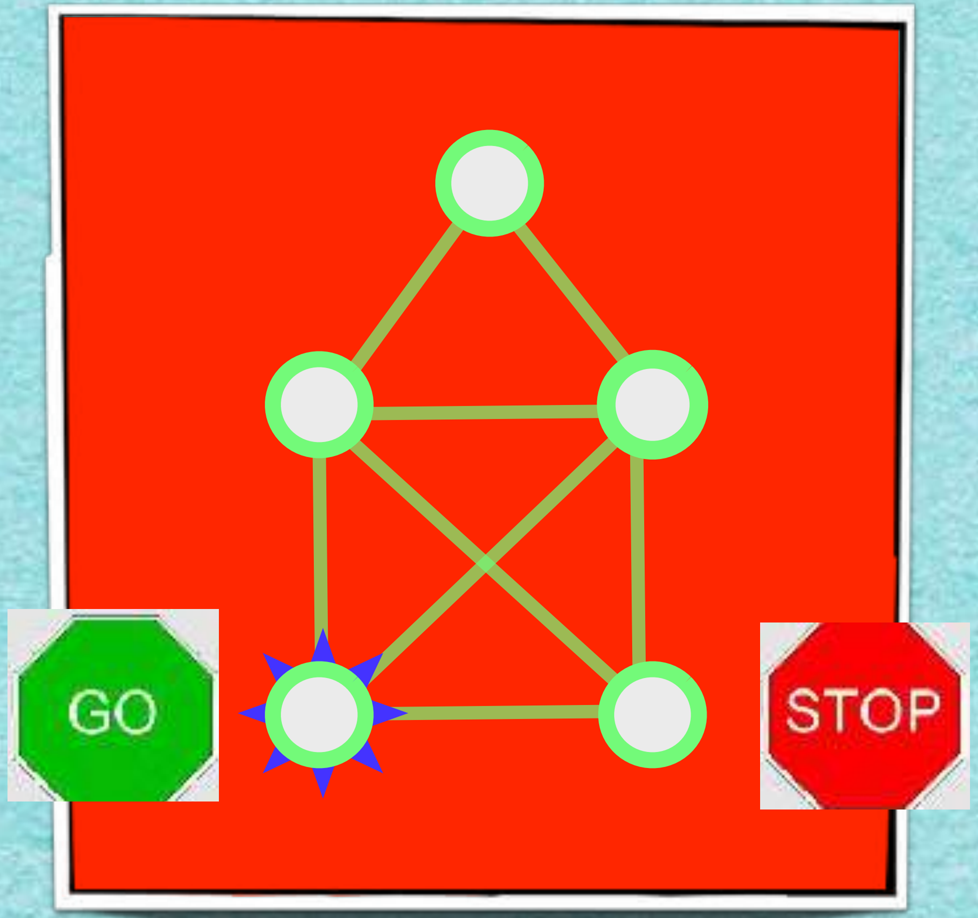
Hmmmmm...

Das Haus des Nikolaus

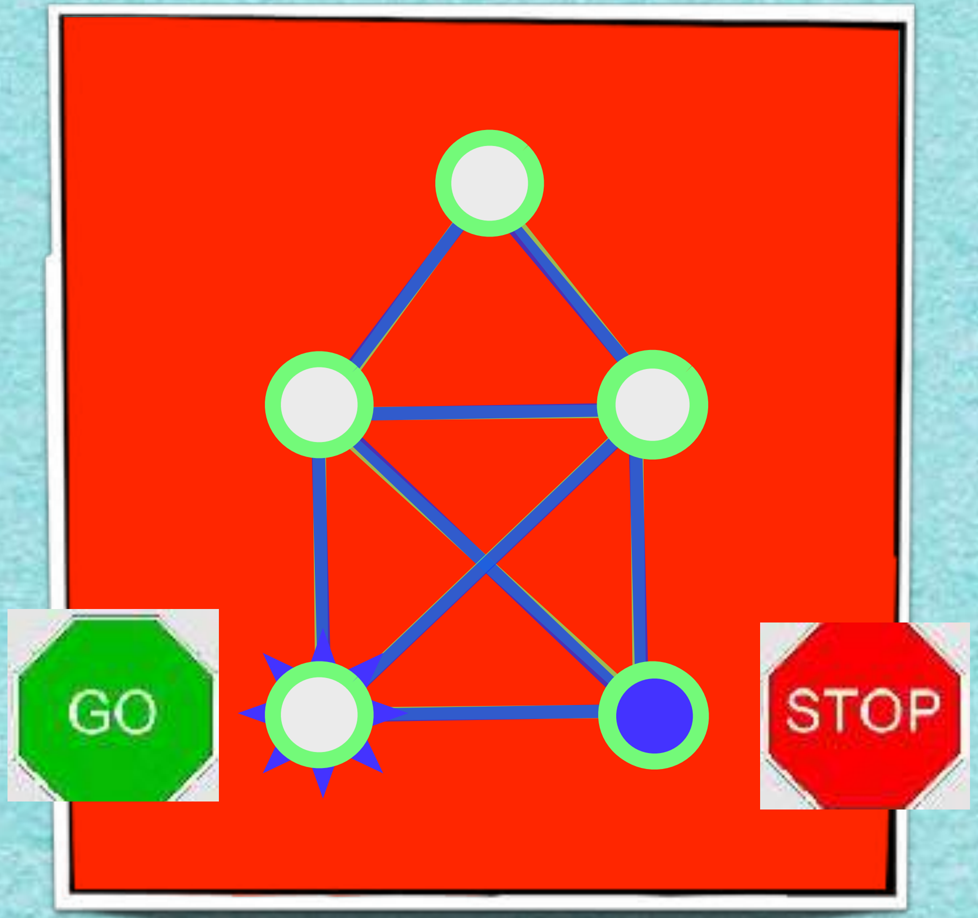


Ohhhhhhh...

Das Haus des Nikolaus

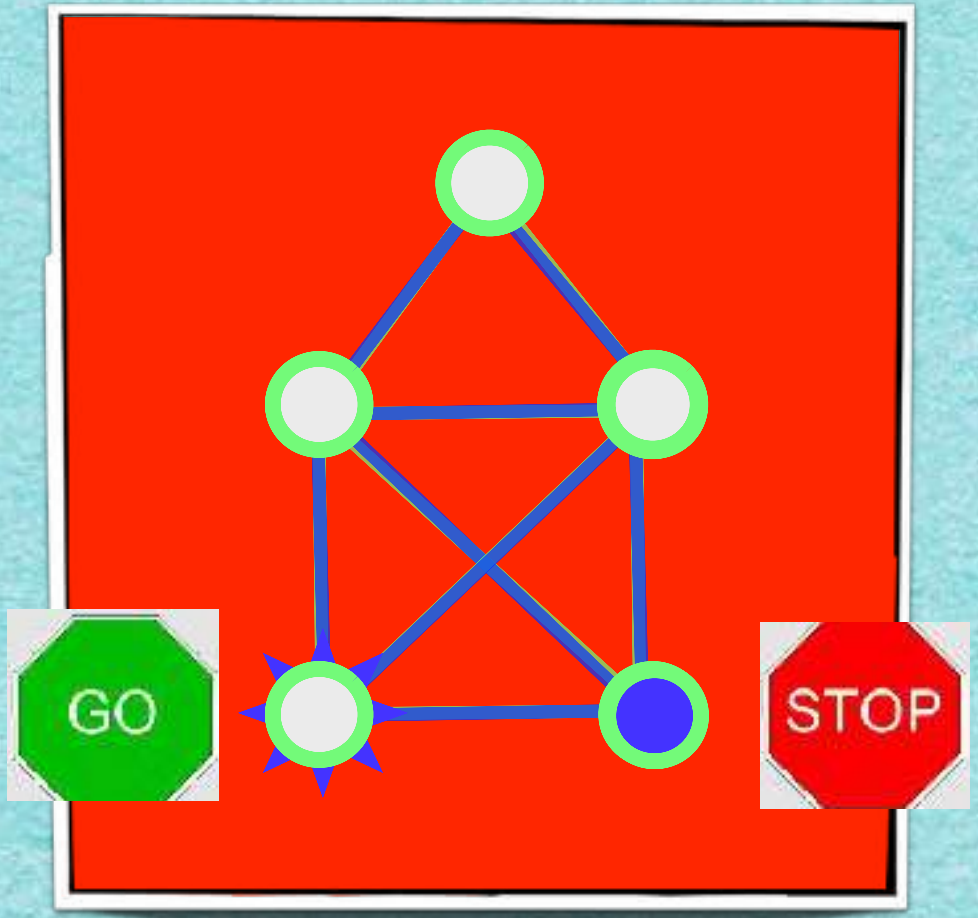


Das Haus des Nikolaus

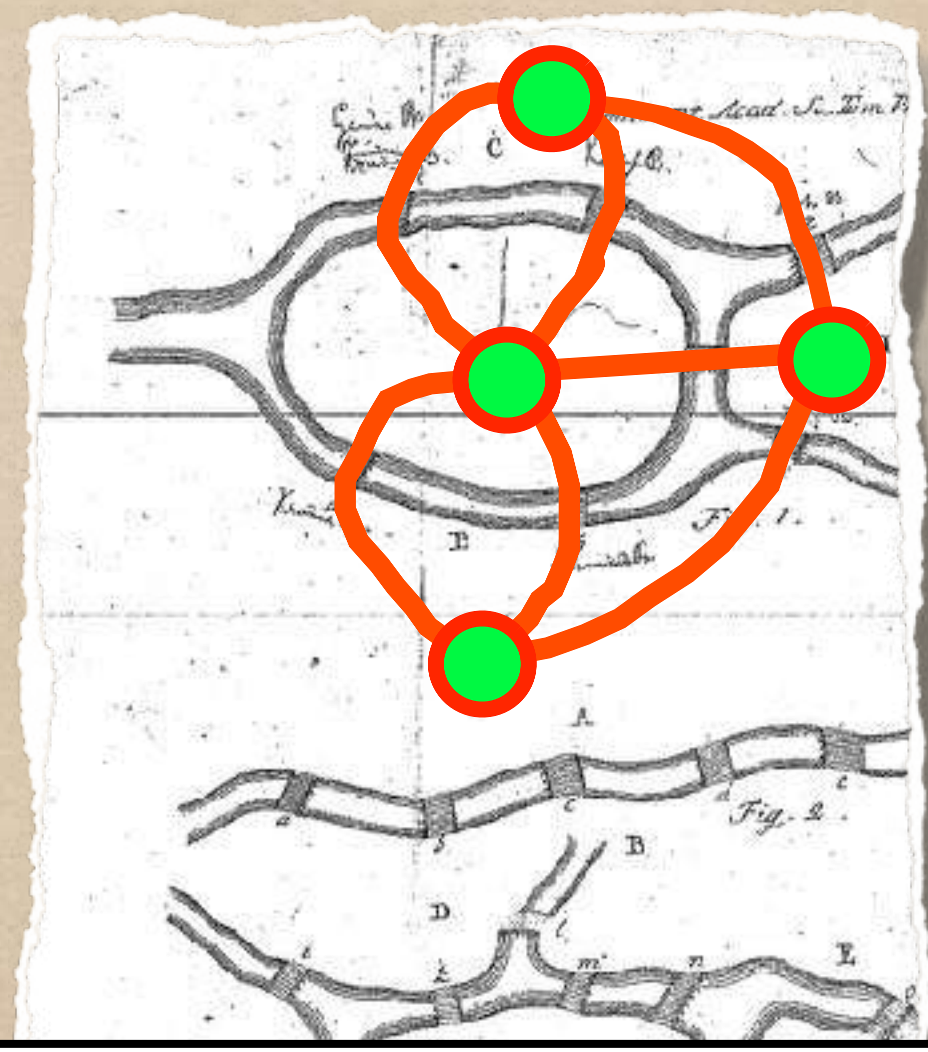


Ahhhhhhh!

Das Haus des Nikolaus



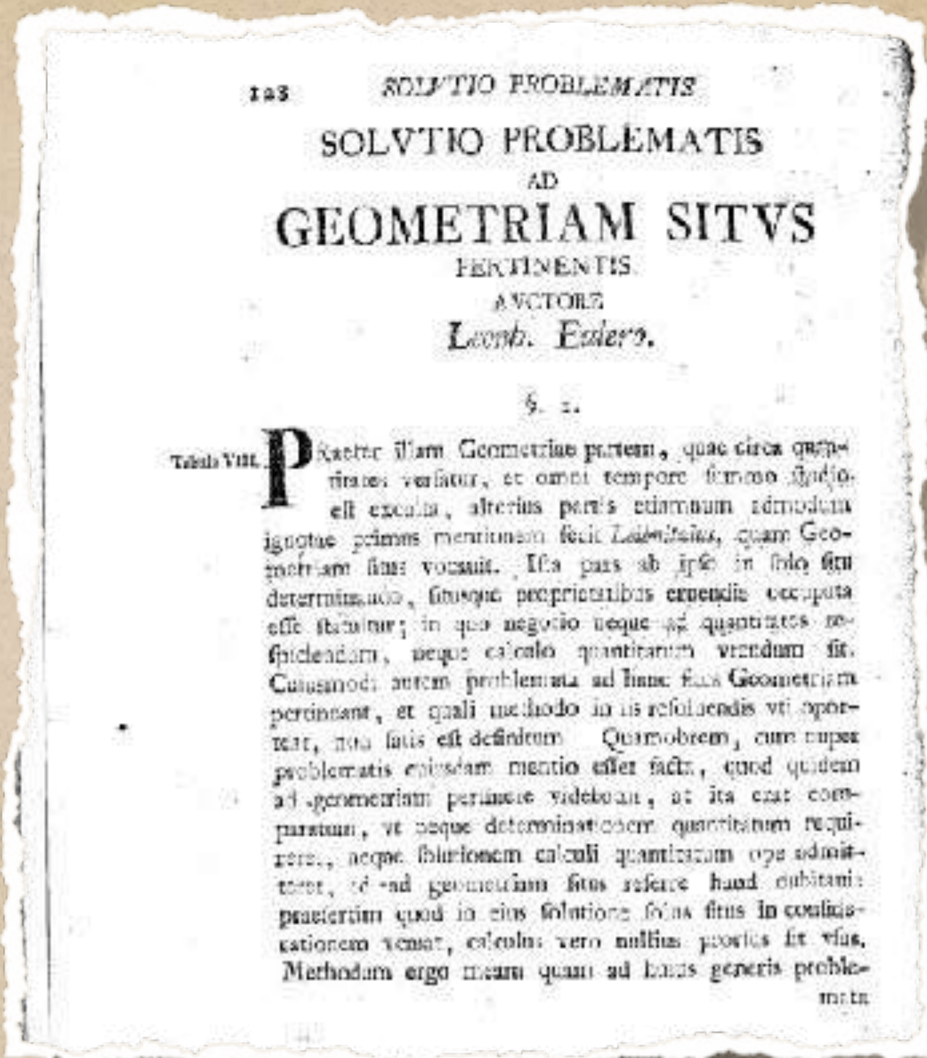
Wichtig: An einem der Knoten mit drei Kanten anfangen, weil man sonst irgendwann dort nicht mehr weg kommt!



- Alle Knoten sind ungerade?!
- Man müsste an allen anfangen oder aufhören!
- Das geht nicht an einem Stück!

Euler: (1) Das gilt für jede beliebige Instanz: Mit mehr als zwei ungeraden Knoten gibt es keinen solchen Weg.

(2) Man kann auch charakterisieren, unter welchen Bedingungen es einen Weg tatsächlich gibt.



128 SOLVTIO PROBLEMATIS

SOLVTIO PROBLEMATIS
AD
GEOMETRIAM SITVS
PERTINENTIS
AVCTORE
Leonh. Eulero.

§. 1.

Tabula VIII. Praeter illam Geometriae partem, quae circa quantitates versatur, et omni tempore summo studio est exculta, alterius partis etiamnum admodum ignotae primus mentionem fecit *Leibnitzius*, quam Geometriam situs vocavit. Ista pars ab ipso in solo situ determinando, situsque proprietatibus eruendis occupata esse statuitur; in quo negotio neque ad quantitates respiciendum, neque calculo quantitatum utendum sit. Cuiusmodi autem problemata ad hanc situs Geometriam pertineant, et quali methodo in iis resolvendis uti oporteat, non satis est definitum. Quamobrem, cum nuper problematis cuiusdam mentio esset facta, quod quidem ad geometriam pertinere videbatur, at ita erat comparatum, ut neque determinationem quantitatum requireret, neque solutionem calculi quantitatum ope admitteret, id ad geometriam situs referre haud dubitavi: praesertim quod in eius solutione solus situs in considerationem veniat, calculus vero nullius prorsus sit usus. Methodum ergo meam quam ad huius generis proble-mata

- Alle Knoten sind ungerade?!
- Man müsste an allen anfangen oder aufhören!
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Euler: (1) Das gilt für jede beliebige Instanz: Mit mehr als zwei ungeraden Knoten gibt es keinen solchen Weg.

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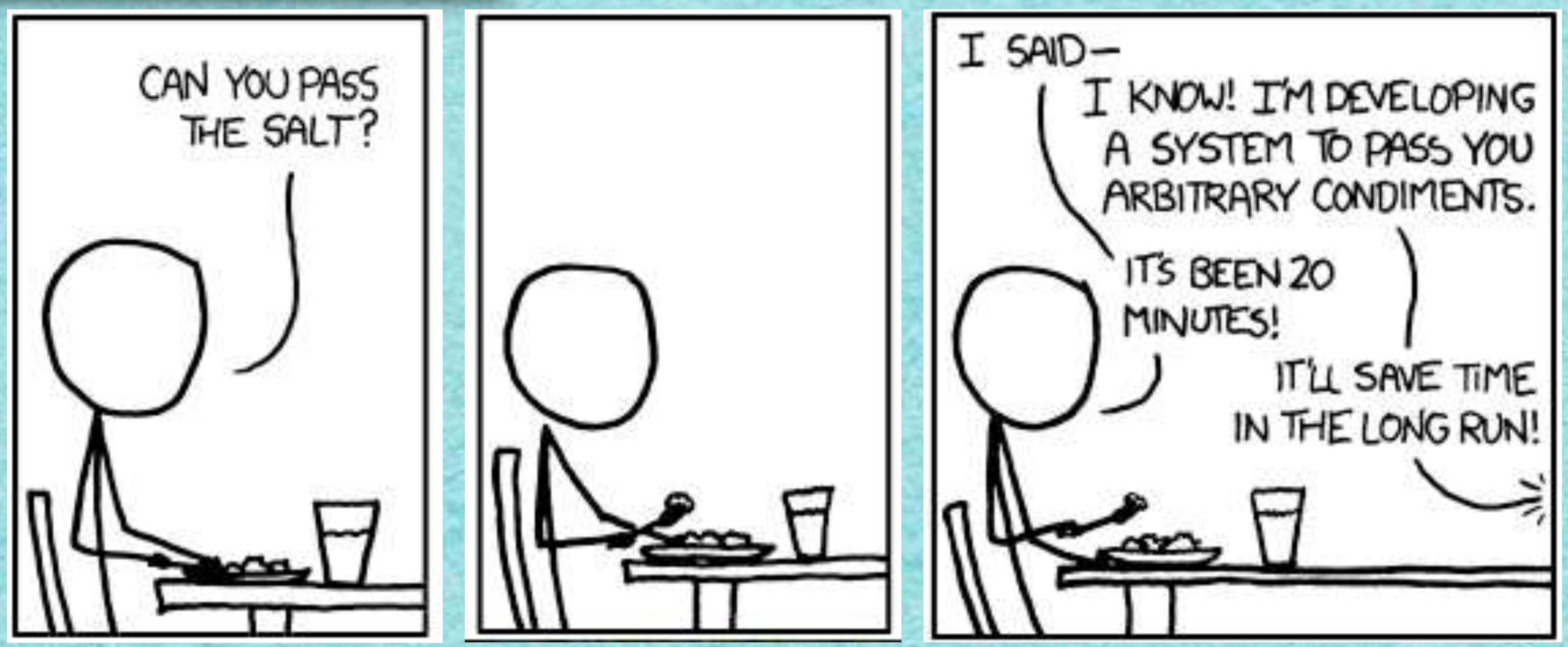
2.1 Historie

Euler hat:

- eine Instanz betrachtet
- ein Problem gelöst
- ein Gebiet begründet

2.1 Historie



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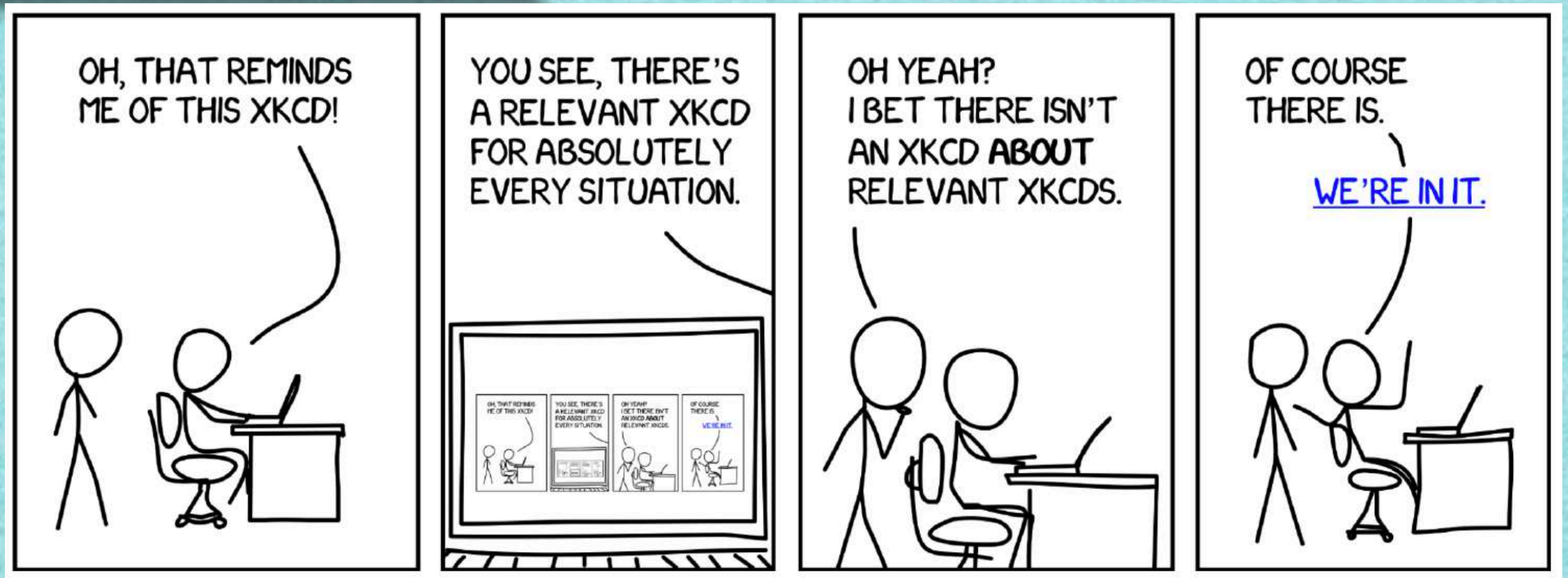
2.1 Historie



Euler hat:

- **eine Instanz betrachtet**
- **ein Problem gelöst**
- **ein Gebiet begründet**

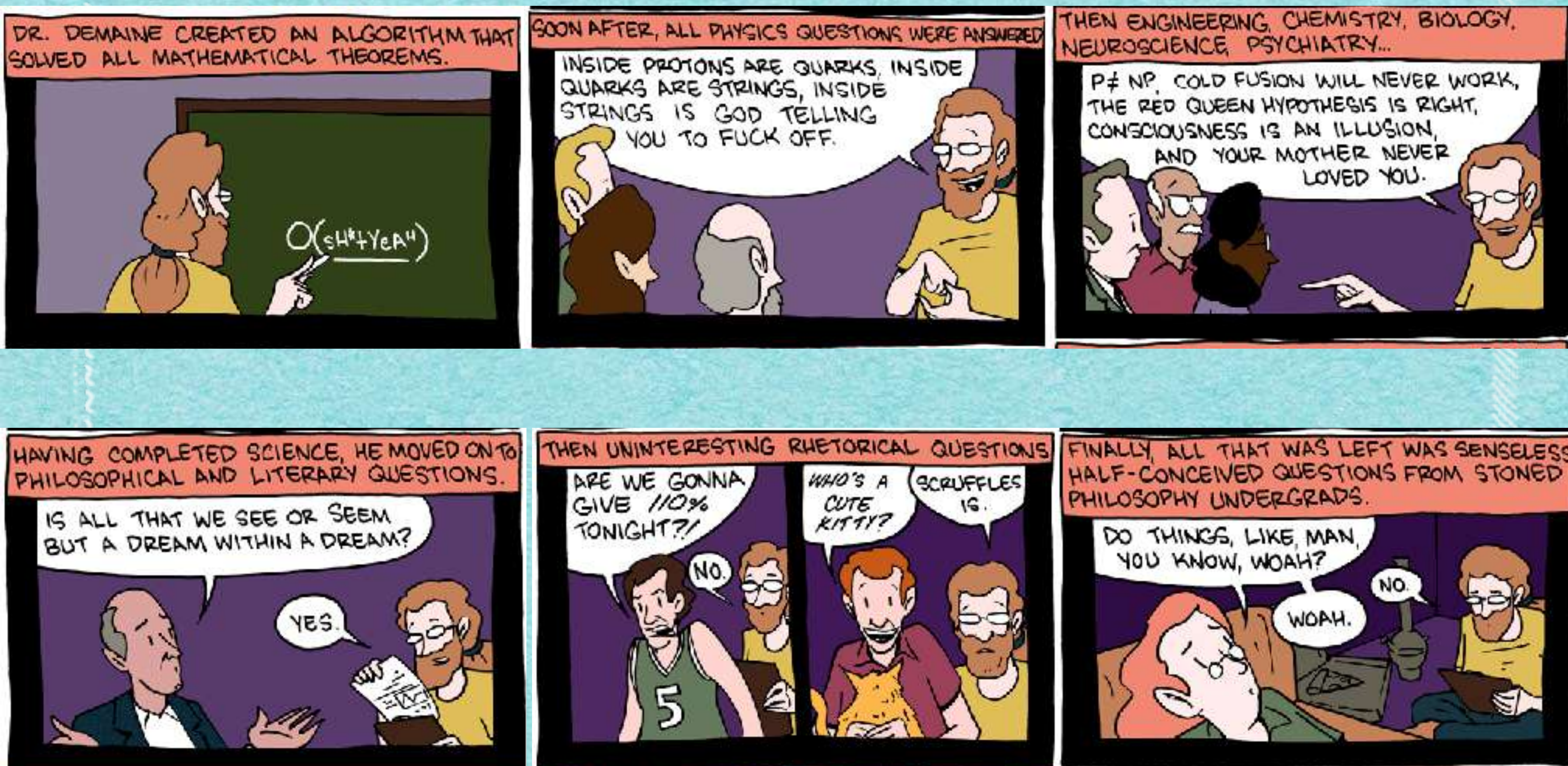
2.1 Historie

Leonhard Euler:

1707 Geboren in Basel
1720 Studienbeginn in Basel
1723 Magister
1727 Berufung an Petersburger Akademie
1731 Professur für Physik

Erik Demaine:

1981 Geboren in Halifax
1993 Studienbeginn in Halifax
1995 Bachelor
1996 Master
2001 Ph.D.
2001 Assistenzprofessor am MIT
2005 Full Professor am MIT


DR. DEMAINE CREATED AN ALGORITHM THAT SOLVED ALL MATHEMATICAL THEOREMS.
O(sH*tYeAH)
SOON AFTER, ALL PHYSICS QUESTIONS WERE ANSWERED
INSIDE PROTONS ARE QUARKS, INSIDE QUARKS ARE STRINGS, INSIDE STRINGS IS GOD TELLING YOU TO FUCK OFF.
THEN ENGINEERING, CHEMISTRY, BIOLOGY, NEUROSCIENCE, PSYCHIATRY...
P ≠ NP, COLD FUSION WILL NEVER WORK, THE RED QUEEN HYPOTHESIS IS RIGHT, CONSCIOUSNESS IS AN ILLUSION, AND YOUR MOTHER NEVER LOVED YOU.
HAVING COMPLETED SCIENCE, HE MOVED ON TO PHILOSOPHICAL AND LITERARY QUESTIONS.
IS ALL THAT WE SEE OR SEEM BUT A DREAM WITHIN A DREAM?
YES.
THEN UNINTERESTING RHETORICAL QUESTIONS
ARE WE GONNA GIVE 110% TONIGHT?!
NO.
WHO'S A CUTE KITTY?
SCRUFFLES IS.
FINALLY, ALL THAT WAS LEFT WAS SENSELESS HALF-CONCEIVED QUESTIONS FROM STONED PHILOSOPHY UNDERGRADS.
DO THINGS, LIKE, MAN, YOU KNOW, WOAH?
NO.
WOAH.

Theoretical Computer Science

Volume 671, 6 April 2017, Pages 4-18

New geometric algorithms for fully connected staged self-assembly ☆

Erik D. Demaine [a], Sándor P. Fekete [b], Christian Scheffer [b], Arne Schmidt [b]

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https://doi.org/10.1016/j.tcs.2016.11.020

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Abstract

We consider *staged self-assembly systems*, in which
can be added to bins in several stages. Within these
connect to each other, depending on the *glue types* c
work by Demaine et al. showed that a relatively smal
suffices to produce arbitrary shapes in this model. Hc
constructions were only based on a spanning tree of
so they did not produce full connectivity of the underl
case of shapes with holes; self-assembly of fully con
with a polylogarithmic number of stages was left as a

Volume 93, February 2021, 101700

Folding polyominoes with holes into a cube ☆

Oswin Aichholzer [a], Hugo A. Akitaya [b], Kenneth C. Cheung [c], Erik D. Demaine [d], Martin L. Demaine [d], Sándor P. Fekete [e], Linda Kleist [e], Irina Kostitsyna [f], Maarten Löffler [g], Zuzana Masárová [h], Klara Mundilova [d], Christiane Schmidt [i]

Show more

https://doi.org/10.1016/j.comgeo.2020.101700

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Abstract

Jetzt wird's genauer!

s.fekete@tu-bs.de