Meth in Pop Culture

'bout to heat up

Rules

- If a question is direct to team **i** all other teams can pounce on it (write down their answers and show it to your PoC). If they get it correct on pounce they get **+20** else **-10**.

- After pounce is closed, bounce starts. Team **i** answers on their direct; they get **+20** if they're correct else **0**. If they get it wrong it goes to the next team (teams who pounced don't get to answer on bounce). This goes on until the question is answered or it comes back to team **i** again.

- If a question is answered by team **j** on bounce, next question is direct to team (**j+1**) mod 6.

Question 1

The song Lateralus, from Tool's 2001 album, carries a unique mathematical significance through the way its lead singer, Maynard James Keenan, sings the following verse:

"Black, then, white are, all I see, in my infancy. Red and yellow then came to be, reaching out to me. Let me see.
As below, so above and beyond I imagine.
Drawn beyond the lines of reason. Push the envelope.
Watch it bend. There is, so, much, more and, beckons me,
to look through these infinite possibilities."

Identify the significance embedded in these lyrics.

SAFETY SLIDE

Answer

Fibonacci sequence

Syllables in the first verse follow the first six numbers of Fibonacci sequence in the pattern, ascending and descending in the sequence 1-1-2-3-5-8-5-3-2-1-1

Q:

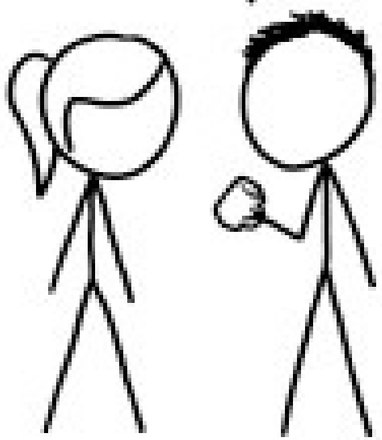
HOW MANY HOLES ARE THERE IN A COFFEE CUP?

TOPOLOGIST

ONE.

NORMAL PERSON

IDK, DOES THE OPENING COUNT AS A HOLE?

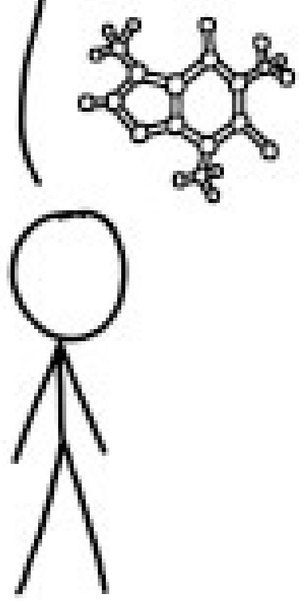


PHILOSOPHER

TO ANSWER THAT QUESTION, CONSIDER ANOTHER: IF WE DRILL A HOLE IN THE SIDE, HOW MANY HOLES ARE THERE NOW?

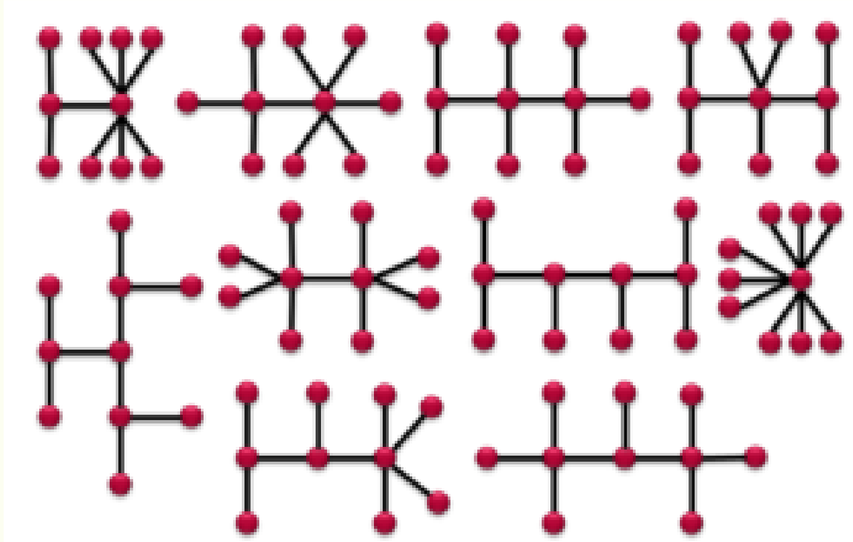
CHEMIST

10^{21} IN THE CAFFEINE ALONE



Question 2

The ten figures shown, which are known as "homeomorphically irreducible trees", are the solution to a famous problem with an unexpectedly cinematic origin. Which 1997 movie popularized this question?



SAFETY SLIDE

Answer

Good Will Hunting

The problem on the board which Matt Damon solves.

Teacher: “You must use disc integration to find the volume of solids of revolution.”

The nerdy kid who knows about shell integration:

The quiet kid who knows about Pappus’ Centroid Theorem:

The engineering kid who puts the solid in a water tank and measures its displacement:

Question 3

This city, situated on both sides of the Pregel River, is now part of modern-day Kaliningrad and features two large islands, Kneiphof and Lomse, which were once connected to each other and to the mainland. The city is renowned for certain structures, among which two were destroyed during WW2 bombings, two were demolished and replaced by a highway, and the remaining three still stand. Identify this city, which played an essential role in the development of a field of mathematics.

SAFETY SLIDE

Answer

Königsberg

Euler solving the Königsberg Bridge Problem gave birth to the domain of Graph Theory

Solve if you are a genius!

$$\zeta(🍍) = \sum_{🍎=1}^{\infty} \frac{1}{🍍🍎}$$

$$\zeta\left(🍍\right) = 0$$

Can you find all the possible values of 🍍 ?

Question 4

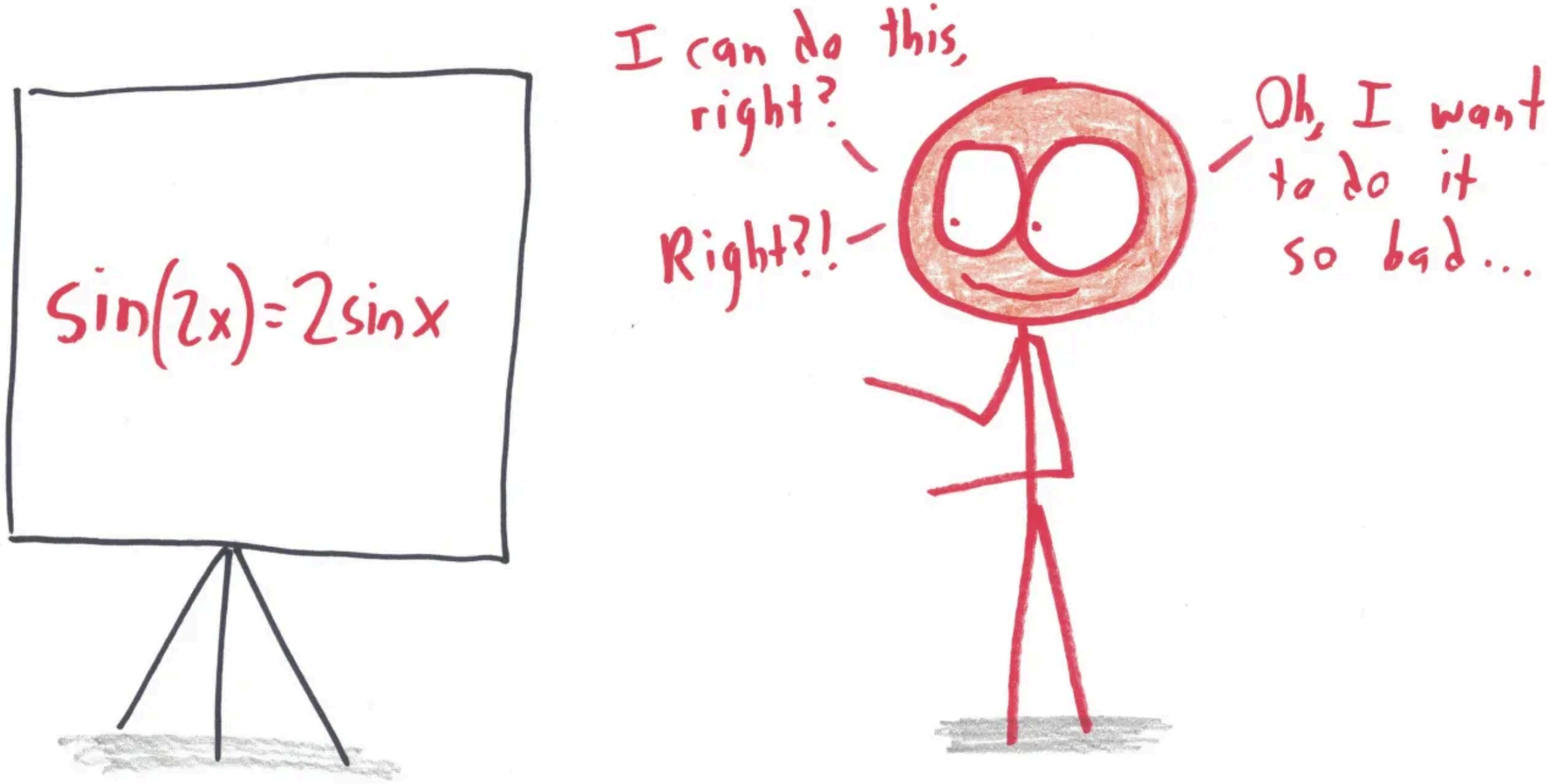
In the background of the Field's Medal is the depiction of a polymath's theorem from his two volume work, which conveys that, given a sphere and a circumscribed cylinder of the same height and diameter, the ratio between their volumes is equal to ⅔. ID the polymath.

SAFETY SLIDE

Answer

Archimedes

the LUST for LINEARITY



Question 5

“Mathematical Tracts on the Lunar and Planetary Theories” is an 1842 text by George Airy covering the mathematics and physics required to understand planetary theories. A modern mathematical phrase can be traced back to this book. In a section in which Airy is deriving the solution to a differential equation, he lets the phase of the wave equation be zero by altering the origin. What is the blanked out phrase which is a staple in most modern mathematics papers? (see next slide)

$$a \sin (nt - \frac{nx}{v} + A).$$

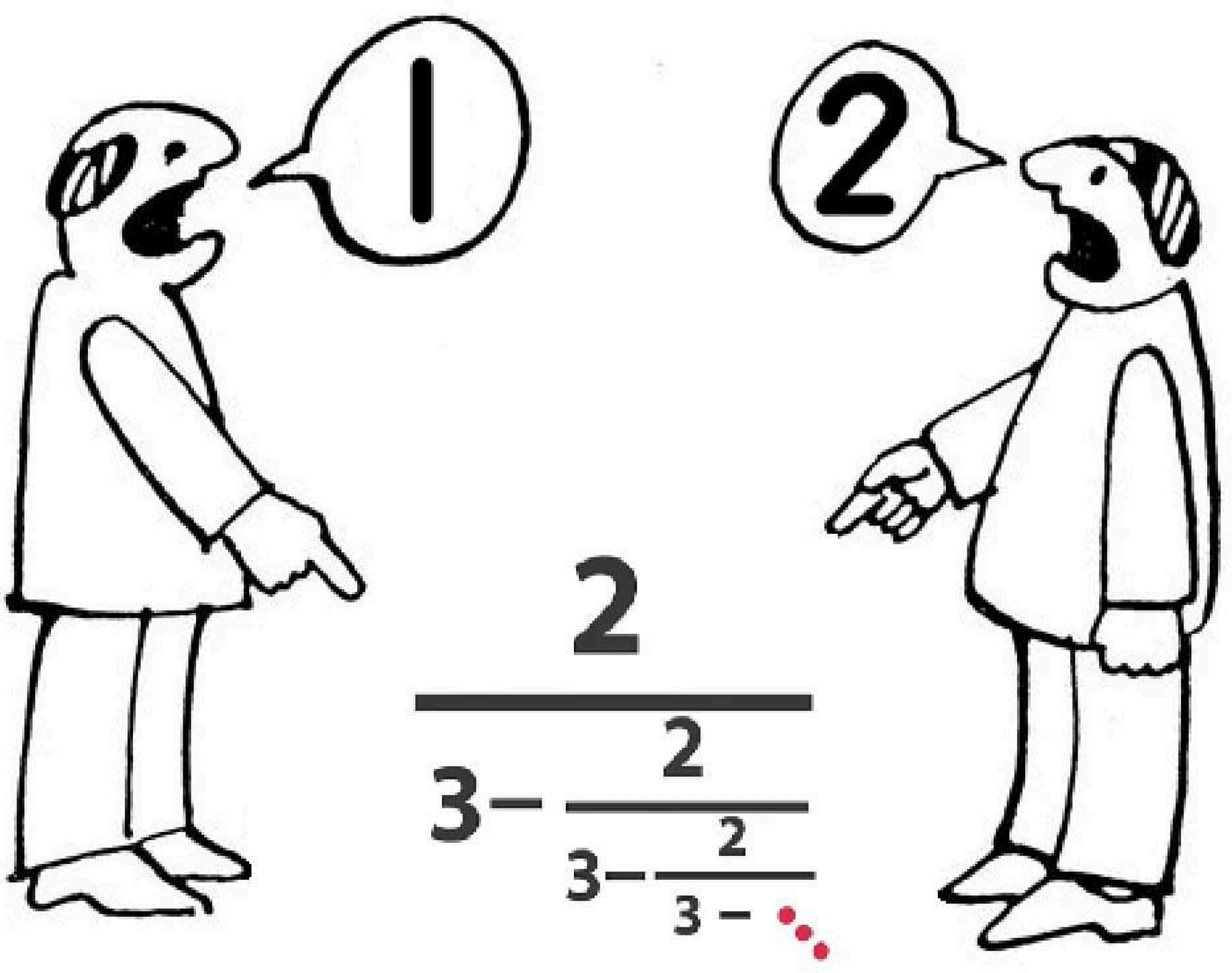
But it is plain that, [redacted], we may get rid of A by altering the origin of time from which t is reckoned, or the origin of linear measure from which x is reckoned. We may therefore take

$$a \sin \left(nt - \frac{nx}{v} \right)$$

SAFETY SLIDE

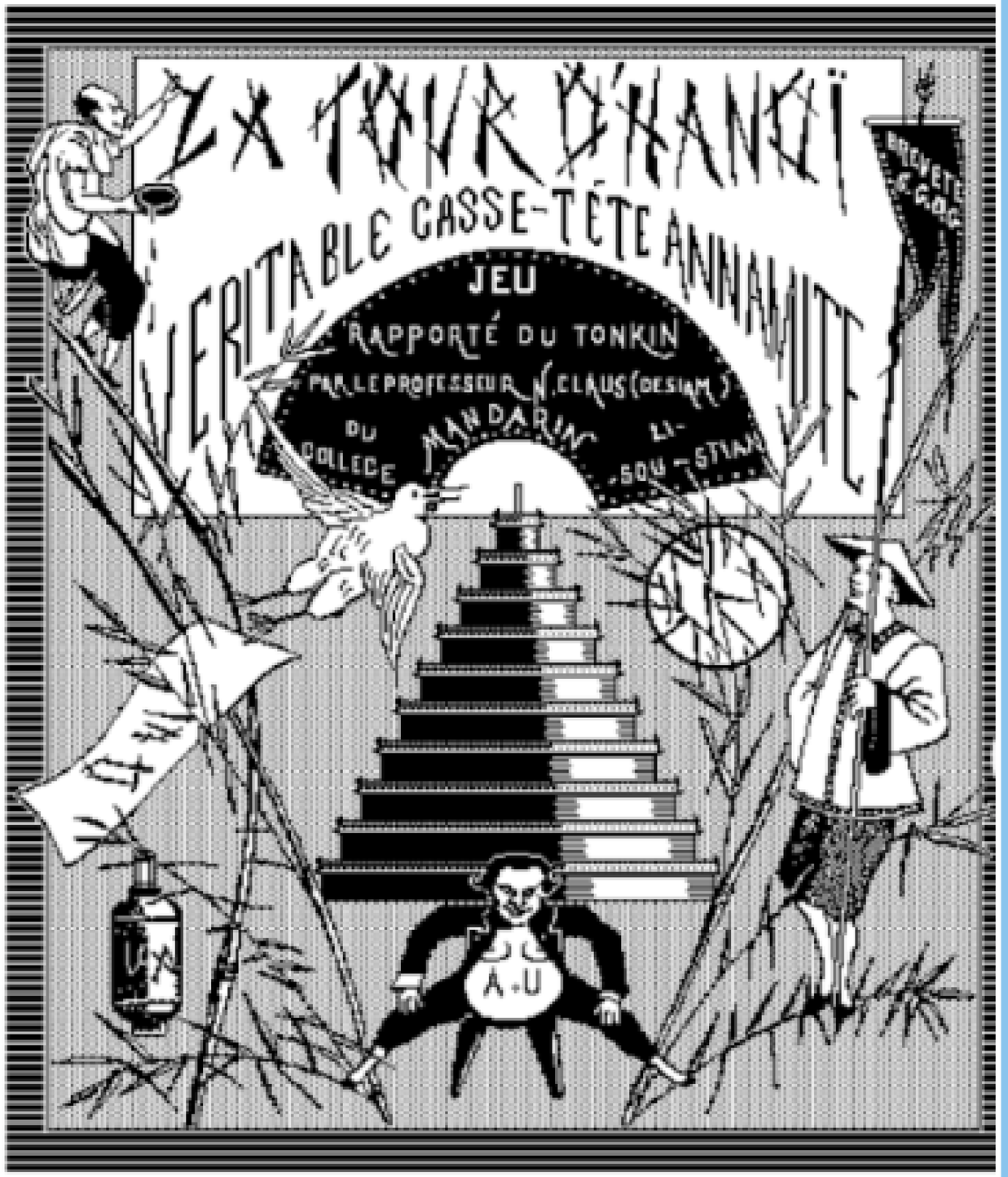
Answer

WLoG - Without Loss of Generality


1
2
$$\cfrac{2}{3-\cfrac{2}{3-\cfrac{2}{3-\ddots}}}$$

Question 6

Marketed as the Authentic Brain Teaser of the Anamites, what puzzle was published by number theorist Edouard Lucas in 1883 under the pseudonym Monsieur Claus de Siam? (see next slide)


LA TOUR D'HANOÏ
VÉRITABLE CASSE-TÊTE ANNAMITE
JEU
RAPPORTÉ DU TONKIN
PAR LE PROFESSEUR N. CLAUS (DE SIAM)
DU MANDARIN LI-
POU-STIAN
POUCE
A.U

SAFETY SLIDE

Answer

Tower of Hanoi

DON TRUMP WHEN YOUNG

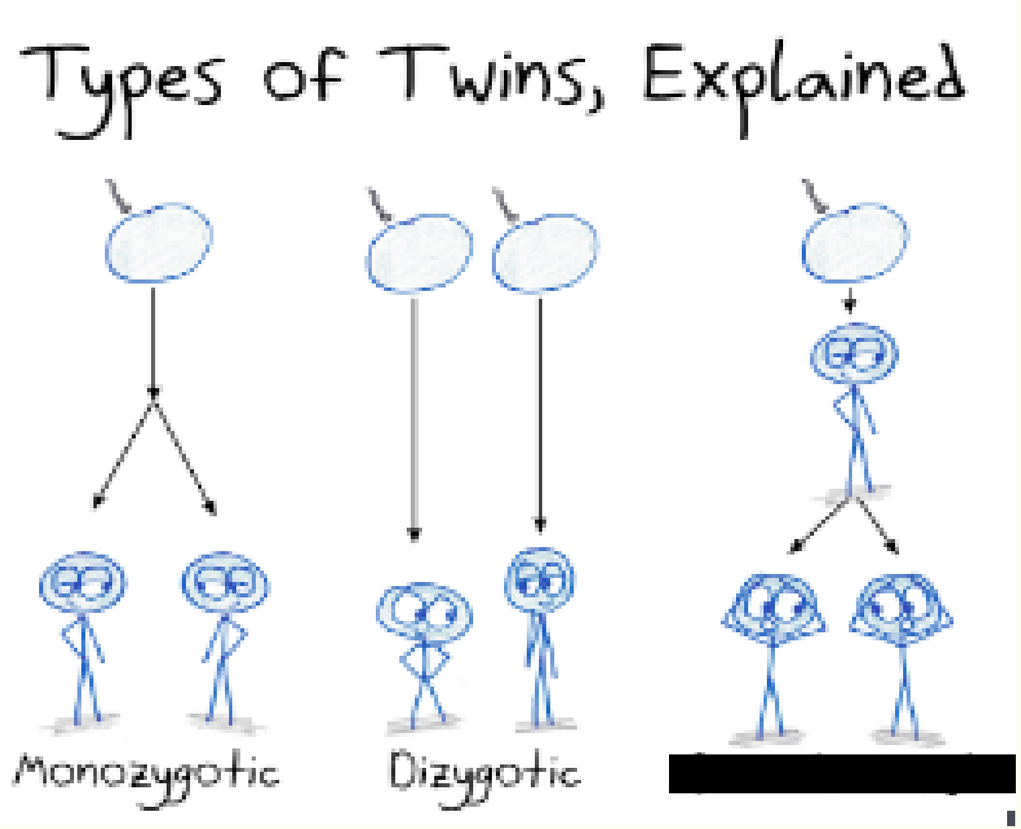
Just minimize $\sum_{i=1}^{18}(x_i - par_i)$.

Cool. Anything else I should know?

Nope. The rest follows trivially.

Question 7

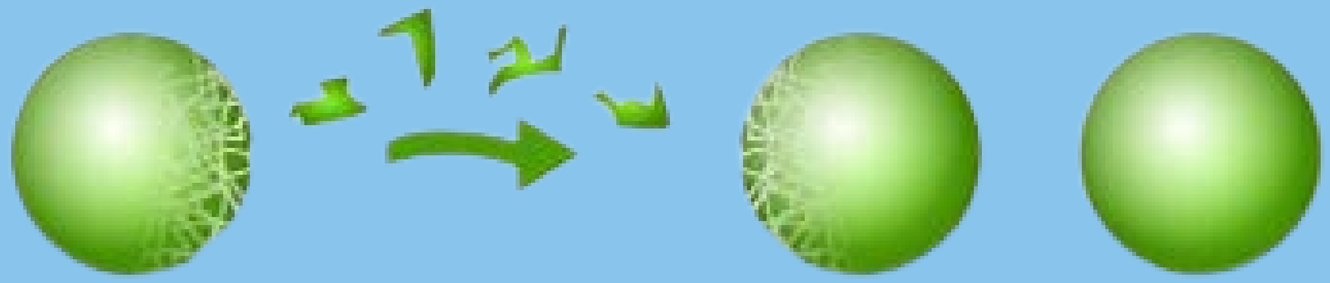
FITB (6, 6)



SAFETY SLIDE

Answer

Banach-Tarski




@MathMatize
det(A)≠0
columns form basis
rank(A)=n
No free variables
Ax=b unique solution
A invertible
0 not an eigenvalue

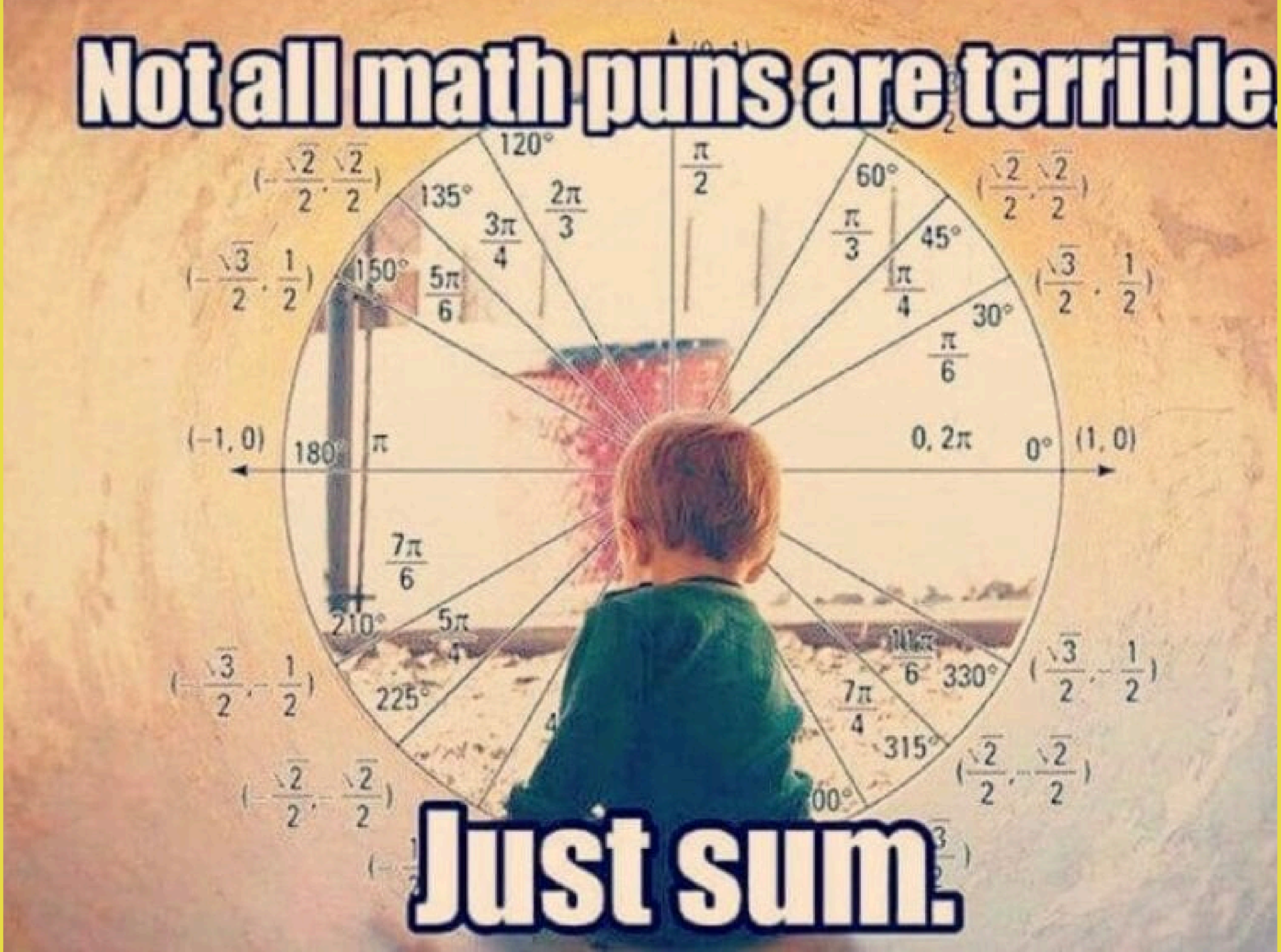
Question 8

The following clip is taken from the Family Guy episode “The King is Dead”. ID the theorem being referred to here. (see next slide)

SAFETY SLIDE

Answer

Infinite Monkey Theorem


Not all math puns are terrible.
Just sum.

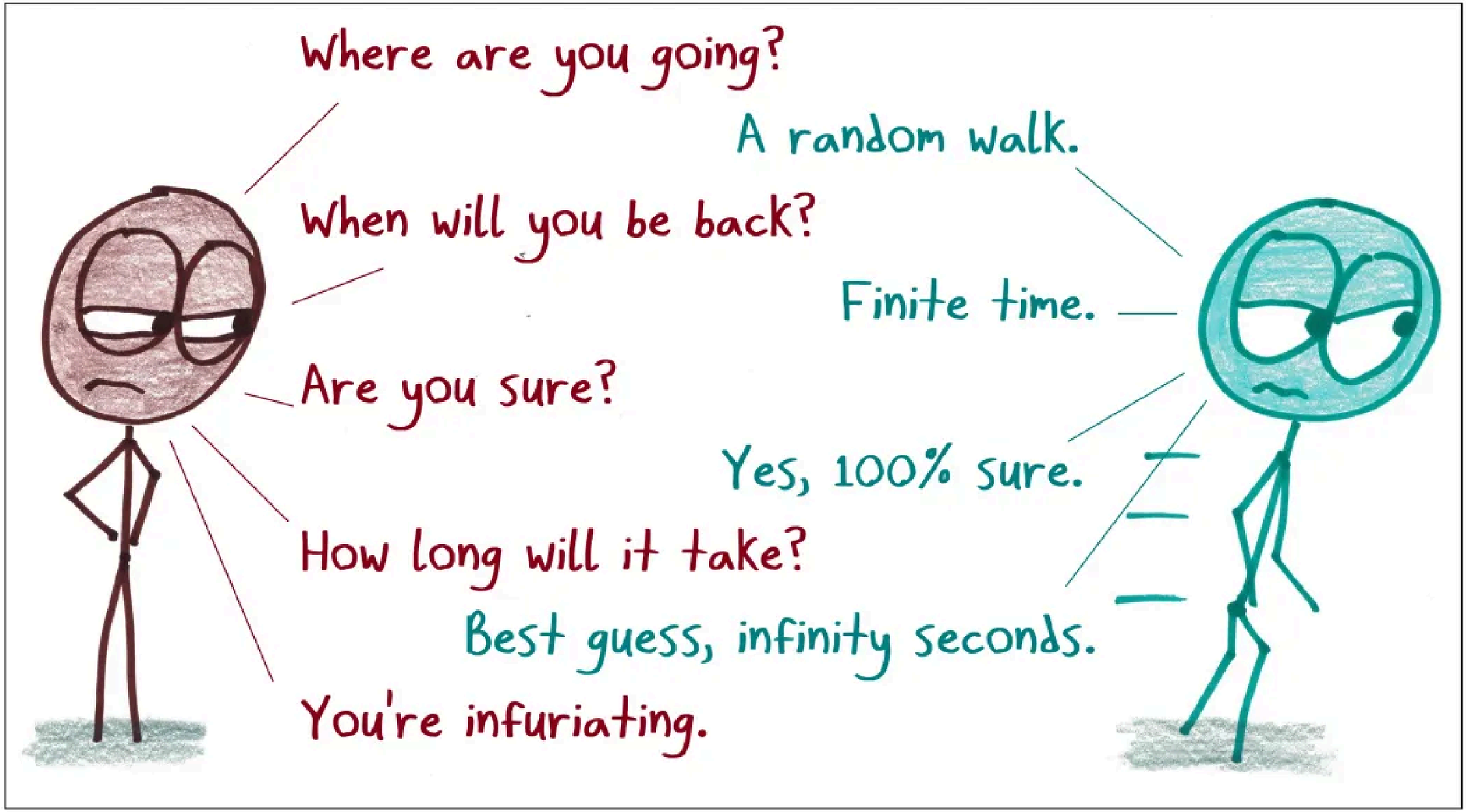
Question 9

We are interested in positive integers, the product of the base-10 digits of whose is equal to a number whose base-10 digit sequence is exactly the reverse of the positive integer. A theorem goes on to say that 73 is the only prime that satisfies this property. Blah blah blah, what is this number called?

SAFETY SLIDE

Answer

Sheldon Prime



The key to any marriage is good communication.

Question 10

The book, “The God Proof”, written by Jeffrey Kegler, is about a proof by this mathematician acknowledging the existence of God. ID the mathematician. (see next slide)

Ax. 1. $(P(\varphi) \wedge \Box\, \forall x(\varphi(x) \Rightarrow \psi(x))) \Rightarrow P(\psi)$

Ax. 2. $P(\neg\varphi) \Leftrightarrow \neg P(\varphi)$

Th. 1. $P(\varphi) \Rightarrow \Diamond\, \exists x\, \varphi(x)$

Df. 1. $G(x) \Leftrightarrow \forall\varphi(P(\varphi) \Rightarrow \varphi(x))$

Ax. 3. $P(G)$

Th. 2. $\Diamond\, \exists x\, G(x)$

Df. 2. $\varphi \text{ ess } x \Leftrightarrow \varphi(x) \wedge \forall\psi\, (\psi(x) \Rightarrow \Box\, \forall y(\varphi(y) \Rightarrow \psi(y)))$

Ax. 4. $P(\varphi) \Rightarrow \Box\, P(\varphi)$

Th. 3. $G(x) \Rightarrow G \text{ ess } x$

Df. 3. $E(x) \Leftrightarrow \forall\varphi(\varphi \text{ ess } x \Rightarrow \Box\, \exists y\, \varphi(y))$

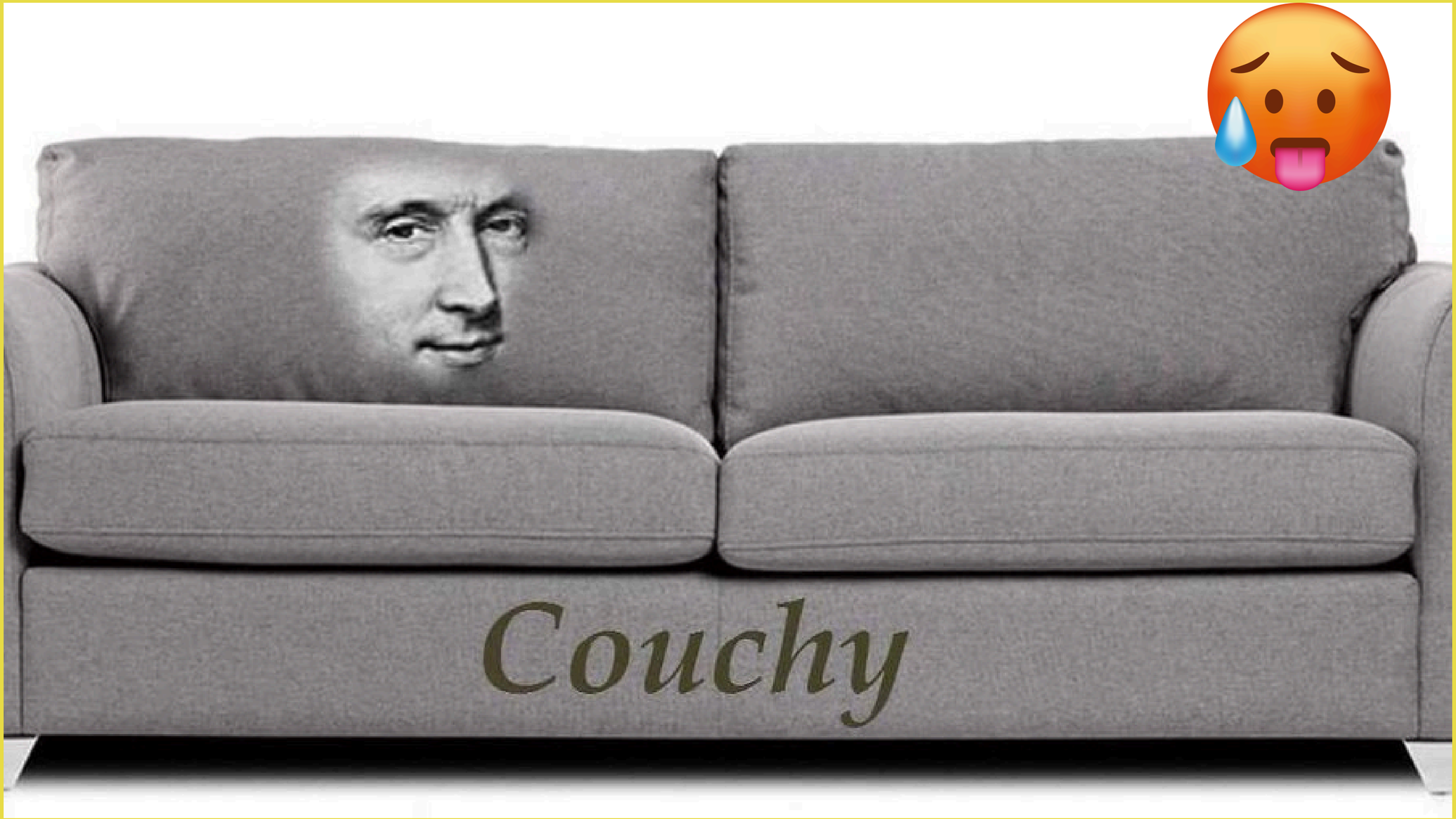
Ax. 5. $P(E)$

Th. 4. $\Box\, \exists x\, G(x)$

SAFETY SLIDE

Answer

Kurt Gödel


Couchy

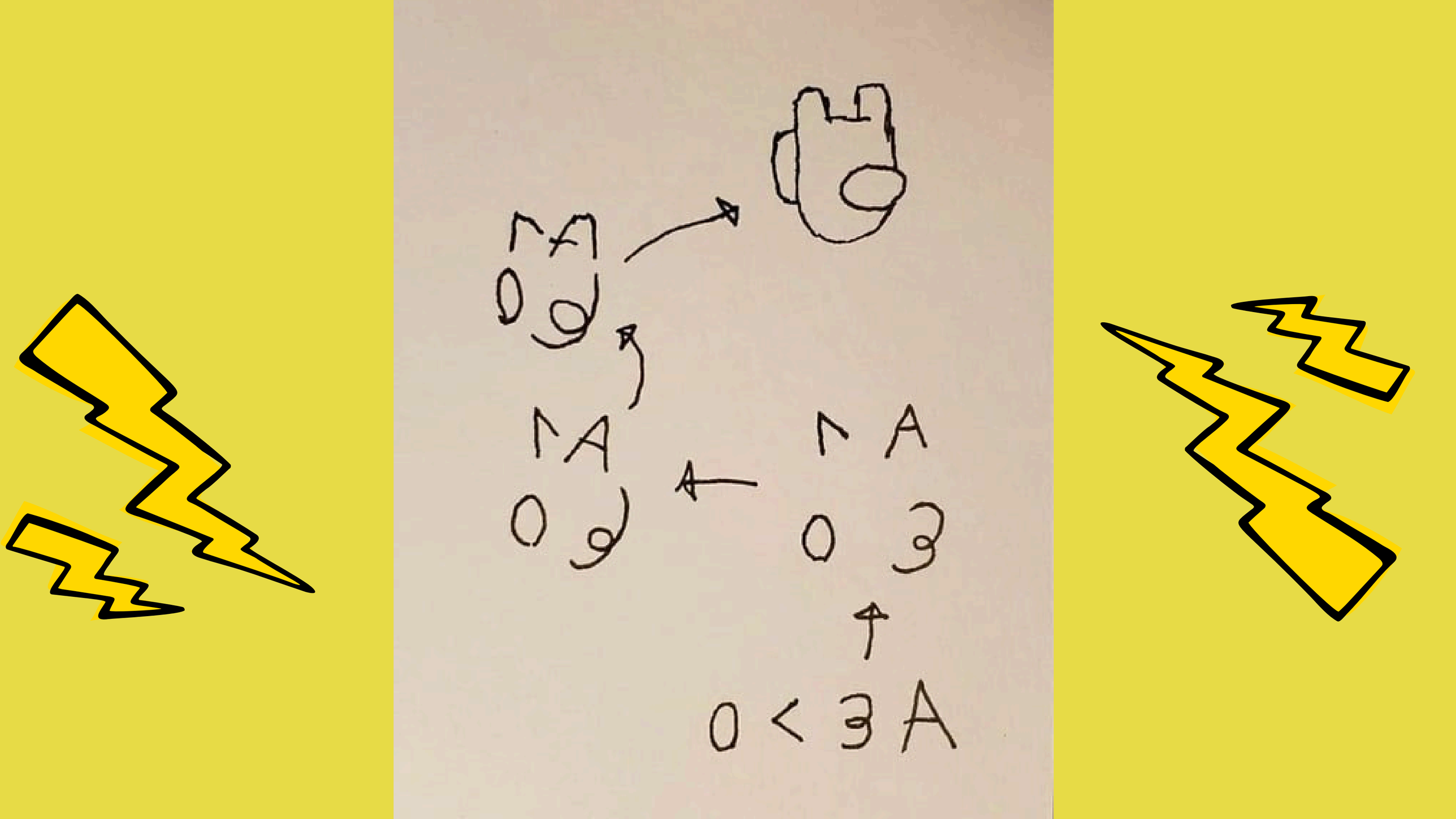
Question 11

These numbers (also known as Armstrong numbers) are the sum of their own digits each raised to the power of the number of digits. Due to their stiffness in character, and immovability in structure, they are named after a certain hunter having a popular Caravaggio depiction. What are these numbers called? (see next slide)

SAFETY SLIDE

Answer

Narcissistic number



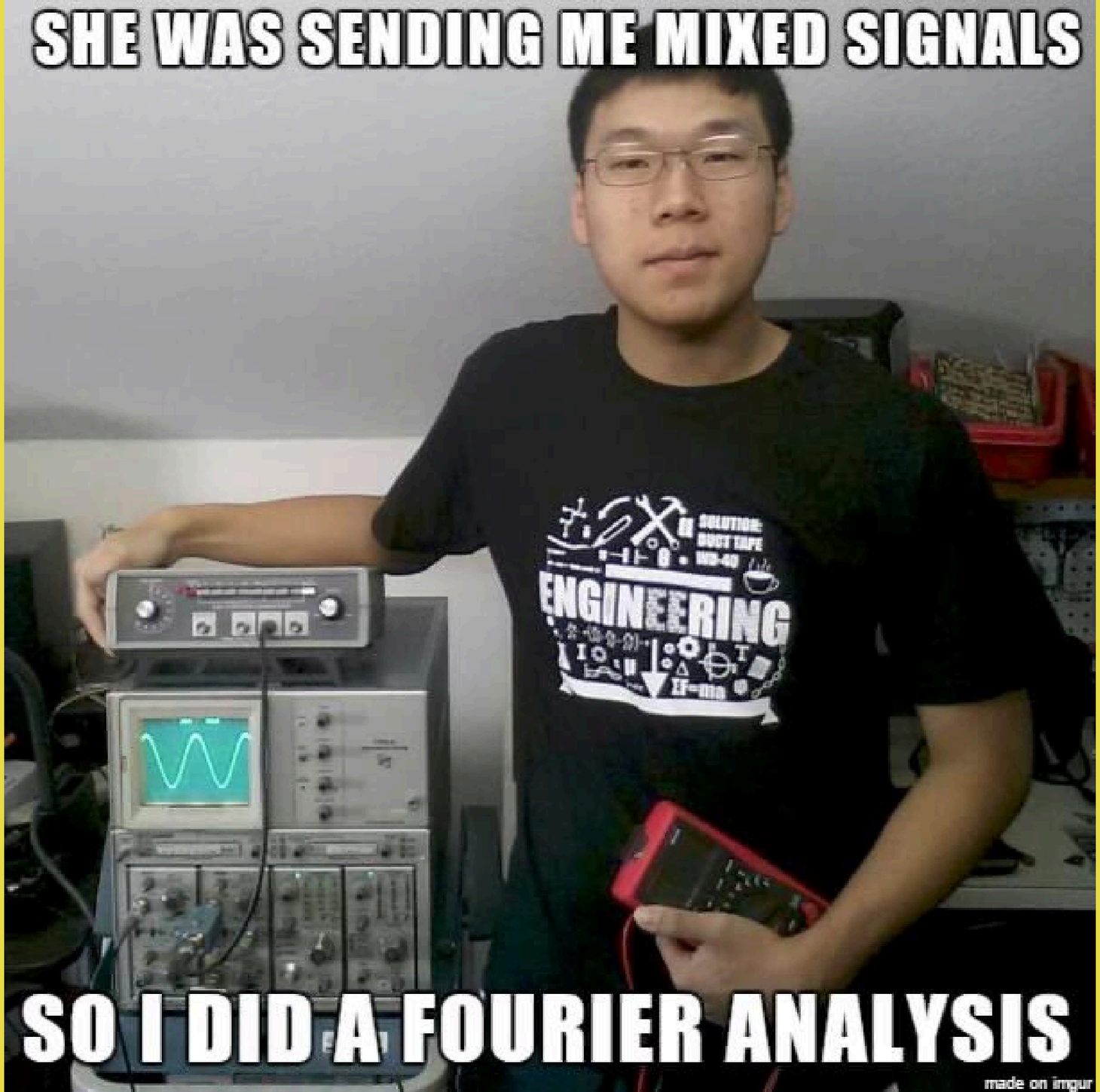
Question 12

After he was defeated in a game of Go despite playing first he got frustrated and ended up inventing the two player strategy game 'Hex' where the first player always has a winning strategy. An early 2000s movie featured a scene depicting him inventing Hex however it was cut from the final version.
ID the mathematician.

SAFETY SLIDE

Answer

John Nash


SHE WAS SENDING ME MIXED SIGNALS
ENGINEERING
SOLUTION: DUCT TAPE
SO I DID A FOURIER ANALYSIS
made on imgur