Scientificness in Mathematical Subjects

Gudmund Hermansen

Today's Topics

- Science and Ethics
- Plagiarism
- Citations and Reference Lists

Why do Research?

Individual Benefits:

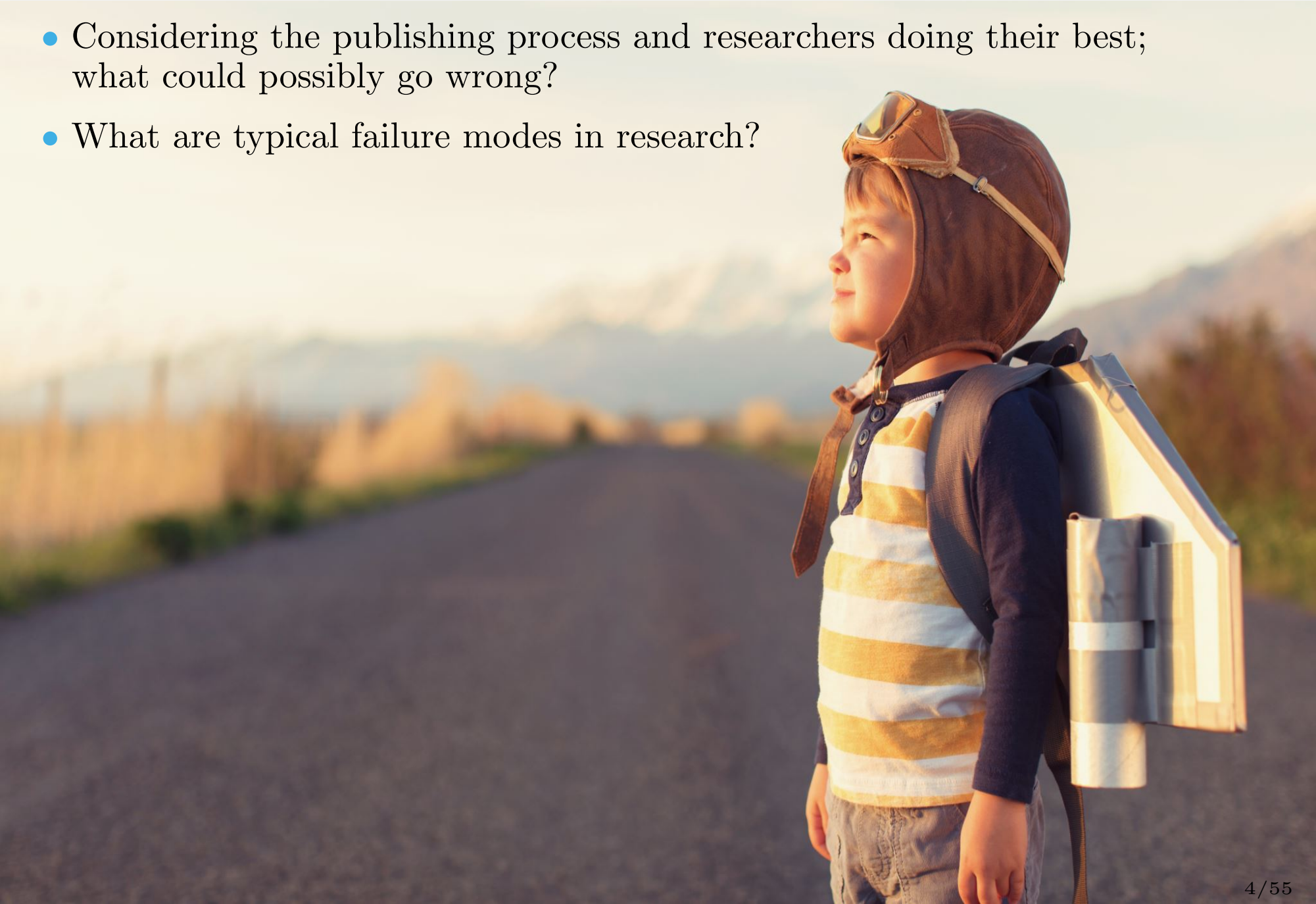
- Use my brain and do something challenging
- It is a lot of fun!
- Career advancement and professional development
- Financial security and success
- Make a lasting impact
- Gain recognition and acknowledgment

For Society:

- Contribute to knowledge production and progress
- Science is the best tool we have for understanding the world
- Make the world a better place

What could possibly go wrong?

- Considering the publishing process and researchers doing their best; what could possibly go wrong?
- What are typical failure modes in research?



Annals of Mathematics, **142** (1995), 443–551

Modular elliptic curves and Fermat's Last Theorem

By Andrew Wiles*

For Nada, Clare, Kate and Olivia

Cubum autem in duos cubos, aut quadratoquadratum in duos quadratoquadratos, et generaliter nullam in infinitum ultra quadratum potestatem in duos ejusdem nominis fas est dividere: cujus rei demonstrationem mirabilem sane detexi. Hanc marginis exiguitas non caperet.

Pierre de Fermat

Introduction

An elliptic curve over $\mathbf{Q}$ is said to be modular if it has a finite covering by a modular curve of the form $X_0(N)$. Any such elliptic curve has the property that its Hasse-Weil zeta function has an analytic continuation and satisfies a functional equation of the standard type. If an elliptic curve over $\mathbf{Q}$ with a given j-invariant is modular then it is easy to see that all elliptic curves with the same j-invariant are modular (in which case we say that the j-invariant is modular). A well-known conjecture which grew out of the work of Shimura and Taniyama in the 1950's and 1960's asserts that every elliptic curve over $\mathbf{Q}$ is modular. However, it only became widely known through its publication in a paper of Weil in 1967 [We] (as an exercise for the interested reader!), in which, moreover, Weil gave conceptual evidence for the conjecture. Although it had been numerically verified in many cases, prior to the results described in this paper it had only been known that finitely many j-invariants were modular.

In 1985 Frey made the remarkable observation that this conjecture should imply Fermat's Last Theorem. The precise mechanism relating the two was formulated by Serre as the ε-conjecture and this was then proved by Ribet in the summer of 1986. Ribet's result only requires one to prove the conjecture for semistable elliptic curves in order to deduce Fermat's Last Theorem.

*The work on this paper was supported by an NSF grant.

Fermat's Proof *of* Fermat's Last Theorem

Johnny E. Magee

Abstract

Employing only basic arithmetic and algebraic techniques that would have been known to Fermat, and utilizing alternate computation methods for arriving at $\sqrt[n]{c^n}$, we identify a governing relationship between $\sqrt{(a^2+b^2)}$ and $\sqrt[n]{(a^n+b^n)}$ (for all $n>2$), and are able to establish that $c=\sqrt[n]{(a^n+b^n)}$ can never be an integer for any value of $n>2$.

AMS Subject Classification (2010): Primary, 11D41
Keywords: Fermat's Last Theorem, Fermat's Equation, Pythagorean Triple

Contents

1 Introduction 1

Theorem 1.1 For all $n>2$ there are no solutions to the equation $(a^n+b^n)=c^n$ where a,b,c,n are all positive integers. 2

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A Lemma 1: The positive integers a and b cannot be equal 4

B Lemma 2: Only coprime positive integers need be considered for a and b 5

C Lemma 3: The positive integers a and b cannot be of the same parity 6

D Lemma 4: For all $n>2$, (a^n+b^n) contains primes not in (a^2+b^2) . . 7

1 Introduction

"It is impossible for a cube to be the sum of two cubes, a fourth power to be the sum of two fourth powers, or in general, for any number that is a power greater than the second to be the sum of two like powers.

I have discovered a truly marvelous demonstration of this proposition that this margin is too narrow to contain" [6].

Pierre de Fermat (1637 [4, p. 139])

Operating on the premise that the construction and examination of equivalent restatements of an equation (and its elements and inverse operations) may reveal properties and relationships that might not otherwise be apparent, we construct such equivalent restatements and from their examination, are able to conclusively demonstrate that $\sqrt[n]{c^n}$ can be an integer only at $n=2$.

Remark The proof of Fermat's Last Theorem rests upon the relationship between $\sqrt{c^2}=\sqrt{(a^2+b^2)}$, and for all $n>2$, $\sqrt[n]{c^n}=\sqrt[n]{(a^n+b^n)}$, both of which are equally regarded as c. Where it is necessary to distinguish between the two values, either distinct side of these two equations may be used interchangeably.

Acknowledgement I can claim no credit for the insights and approaches contained within this paper. All were gifts from God. And it is only to him that praise is due.

Science or Joke?

A SIMPLE PROOF THAT π IS IRRATIONAL

IVAN NIVEN

Let $\pi = a/b$, the quotient of positive integers. We define the polynomials

$$f(x) = \frac{x^n(a - bx)^n}{n!},$$

$$F(x) = f(x) - f^{(2)}(x) + f^{(4)}(x) - \cdots + (-1)^n f^{(2n)}(x),$$

the positive integer n being specified later. Since $n!f(x)$ has integral coefficients and terms in x of degree not less than n, $f(x)$ and its derivatives $f^{(j)}(x)$ have integral values for $x = 0$; also for $x = \pi = a/b$, since $f(x) = f(a/b - x)$. By elementary calculus we have

$$\frac{d}{dx}\{F'(x) \sin x - F(x) \cos x\} = F''(x) \sin x + F(x) \sin x = f(x) \sin x$$

and

$$(1) \qquad \int_0^\pi f(x) \sin x dx = [F'(x) \sin x - F(x) \cos x]_0^\pi = F(\pi) + F(0).$$

Now $F(\pi) + F(0)$ is an *integer*, since $f^{(j)}(\pi)$ and $f^{(j)}(0)$ are integers. But for $0 < x < \pi$,

$$0 < f(x) \sin x < \frac{\pi^n a^n}{n!},$$

so that the integral in (1) is *positive, but arbitrarily small* for n sufficiently large. Thus (1) is false, and so is our assumption that π is rational.

PURDUE UNIVERSITY

Received by the editors November 26, 1946, and, in revised form, December 20, 1946.

A simple proof that π is rational*

Peter Rowlett

1st April 2013

Abstract

The number pi, written using the symbol π, is a mathematical constant that is the ratio of a circle's circumference to its diameter, and has been claimed since antiquity to be an irrational number, meaning that it cannot be expressed exactly as a ratio of two integers, and that therefore its decimal expansion never ends or settles into a permanent repeating pattern. Here a proof is given that π can indeed be expressed as a ratio of two integers, $\frac{4}{1^7}$, a fact that has unbelievably been overlooked until now. Moreover, this proof is understandable to anyone with a basic knowledge of algebra and calculus and arises from simply considering a standard integral at two values of x, $x = \frac{1}{4}$ and $x = 1$. Of course I doubted the result at first, given that it has been overlooked for so many years, but I have checked the proof and verified it to be correct. This is a crucial and important revelation that will significantly alter all of mathematics.

1 A formula for π

First we note that

$$\int \frac{1}{x^2 + a^2} dx = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right)$$

and

$$\tan^{-1}(1) = \frac{\pi}{4}.$$

Since x can take any value, consider what happens when $x = \frac{1}{4}$. Then:

$$\int \frac{1}{x^2 + \left(\frac{1}{4}\right)^2} dx = 4 \tan^{-1}(1) = \pi. \qquad (1)$$

*Cite this as: Rowlett, P., 2013. A simple proof that π is rational. *Travels in a Mathematical World*, 1st April. Available via: http://travels.aperiodical.com/2013/04/a-simple-proof-that-pi-is-irrational.html

Cases of Fraud and Misconduct

MMR vaccine controversy

From Wikipedia, the free encyclopedia

The **MMR vaccine controversy** started with the 1998 publication of a fraudulent research paper in *The Lancet* linking the combined measles, mumps, and rubella (MMR) vaccine to colitis and autism spectrum disorders.[1] The claims in the paper were widely reported,[2] leading to a sharp drop in vaccination rates in the UK and Ireland and increases in the incidence of measles and mumps, resulting in deaths and serious permanent injuries.[3][4] Following the initial claims in 1998, multiple large epidemiological studies were undertaken. Reviews of the evidence by the Centers for Disease Control and Prevention,[5] the American Academy of Pediatrics, the Institute of Medicine of the US National Academy of Sciences,[6] the UK National Health Service,[7] and the Cochrane Library[8] all found no link between the MMR vaccine and autism.

An investigation by journalist Brian Deer found that Andrew Wakefield, the author of the original research paper linking the vaccine to autism, had multiple undeclared conflicts of interest,[9][10] had manipulated evidence,[11] and had broken other ethical codes. The *Lancet* paper was partially retracted in 2004, and fully retracted in 2010, when *Lancet*'s editor-in-chief Richard Horton described it as "utterly false" and said that the journal had been "deceived".[12] Wakefield was found guilty by the General Medical Council of serious professional misconduct in May 2010 and was struck off the Medical Register, meaning he could no longer practice as a doctor in the UK.[13] In 2011, Deer provided further information on Wakefield's improper research practices to the *British Medical Journal*, which in a signed editorial described the original paper as fraudulent.[14][15] The scientific consensus is the MMR vaccine has no link to the development of autism, and that this vaccine's benefits greatly outweigh its risks.

Wakefield's paper was described as "perhaps, the most damaging medical hoax of the last 100 years".[16] Physicians, medical journals, and editors[17][18][19][20][21] have described Wakefield's actions as fraudulent and tied them to epidemics and deaths.[22][23]

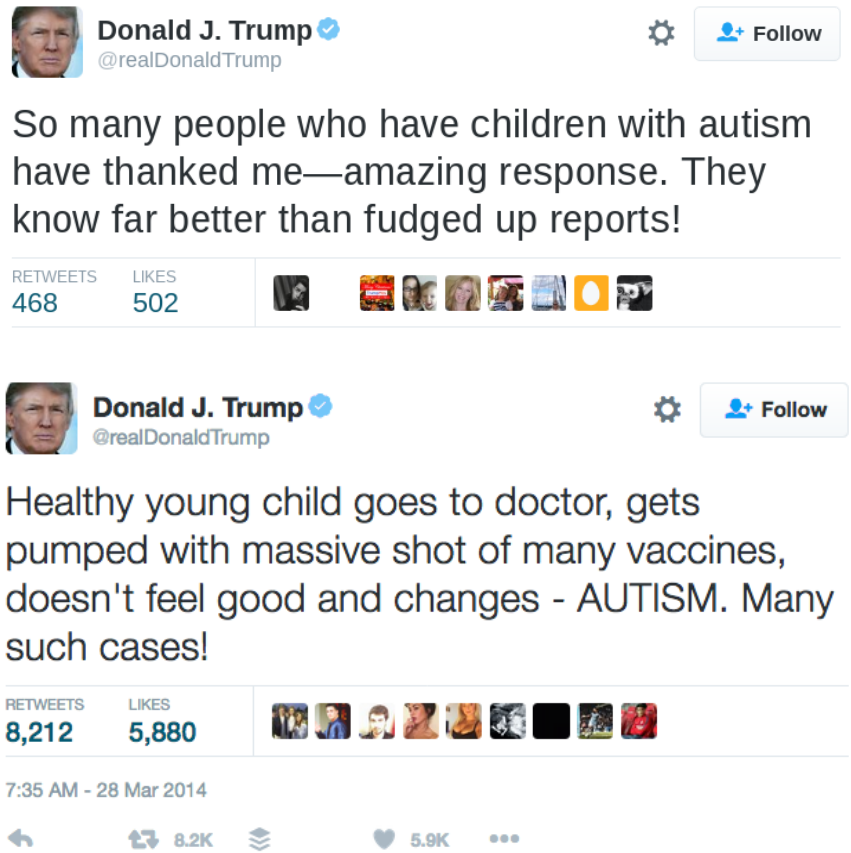
Wikipedia: MMR vaccine controversy

Cases of Fraud and Misconduct

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Wikipedia: MMR vaccine controversy

Fake Papers



VIEWPOINTS REPUBLISH PRINT

Opinion: I Published a Fake Paper in a 'Peer-Reviewed' Journal

A dubious education journal invited me to submit a manuscript that would undergo "rigorous" review. It was far too easy.

Visual: DigitalVision Vectors / Getty Images

BY BRADLEY ALLF 11.26.2020 7 COMMENTS

Experiential Learning in Secondary Education Chemistry Courses: A Significant...

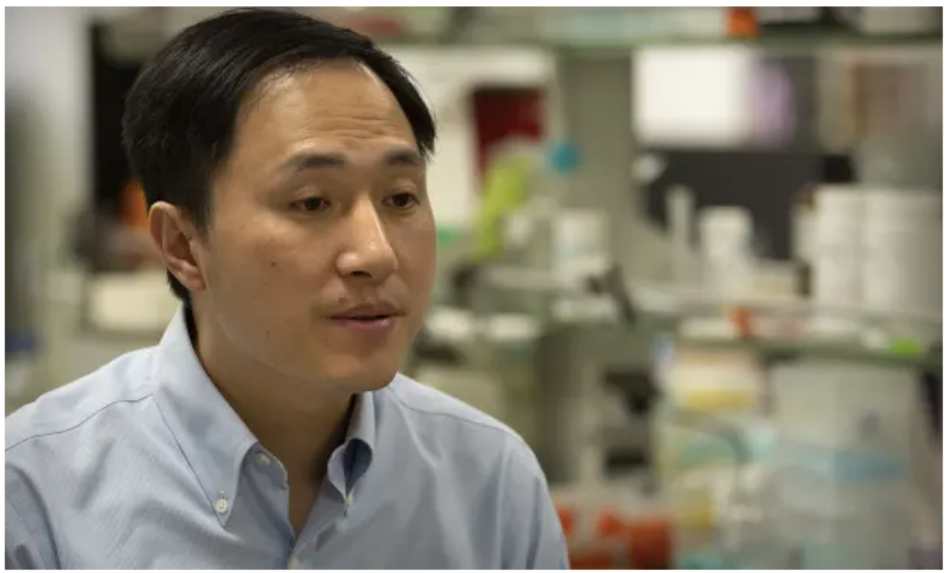
Chinese scientist who edited babies' genes jailed for three years

He Jiankui was guilty of illegal practices in trying to alter the genetic makeup of twin girls

Ian Sample *Science editor*

@iansample

Tue 31 Dec 2019 00.23 GMT



He Jiankui's gene-editing experiments in China caused global outcry. Photograph: Mark Schiefelbein/AP

A Chinese court has sentenced He Jiankui, the scientist who sparked global controversy last year when he claimed to have created the world's first "gene-edited" children, to three years in prison for violating medical regulations.

He shocked the scientific community when he announced at a conference in Hong Kong that he had created genetically modified twin sisters, dubbed Lulu and Nana, and that a third child was on the way.

The Guardian article

Elizabeth Holmes – Theranos



Holmes (centre) remains on bail before sentencing at a later date

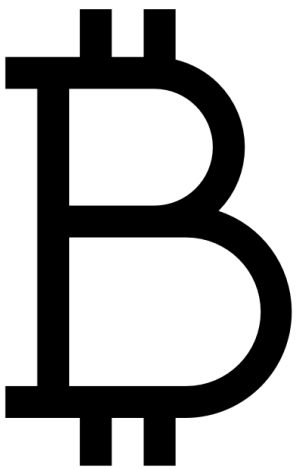
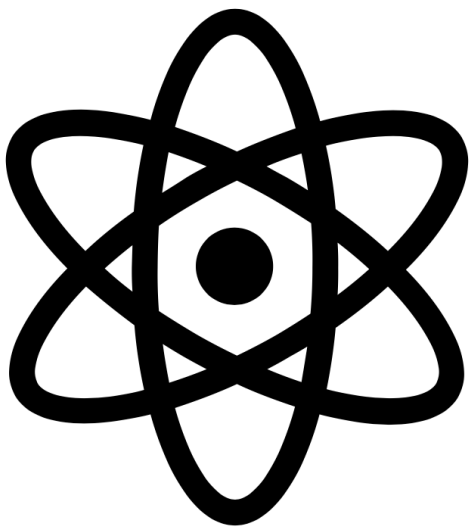
Theranos founder Elizabeth Holmes has been convicted of defrauding investors after a months-long landmark trial in California.

Prosecutors said Holmes knowingly lied about technology she said could detect diseases with a few drops of blood.

Jurors found Holmes guilty of conspiracy to commit fraud against investors and three charges of wire fraud.

Any Ethical Issues in Mathematics?

- Hardy: mathematics is morally neutral (*A Mathematician's Apology*)
- Harmful cultures exist: prestige, competition, "fake it till you make it"
- Typical ethical pitfalls:
  - Overselling novelty or impact
  - Claiming others' ideas/proofs as your own
  - Vague references and unverifiable claims


Not All Bad Science is Deliberate Fraud

Discussion question:

How should we distinguish **intentional misconduct** from **well-intentioned but flawed practices** – and why does that distinction matter?

Be Aware of Bad Science!

Research Misconduct:

- Sloppy research methods
- Fabrication or falsification of data
- **Misuse of generative AI**
- **Plagiarism**
- Ethically disturbing research topics
- Impact manipulation (citation rings, etc.)
- Serious consequences for violations

Publishing Industry Problems:

- Predatory journals and fake conferences
- Journal hijacking
- Excessive publication fees
- Publication bias
- Corruption in peer review

Personal Pitfalls:

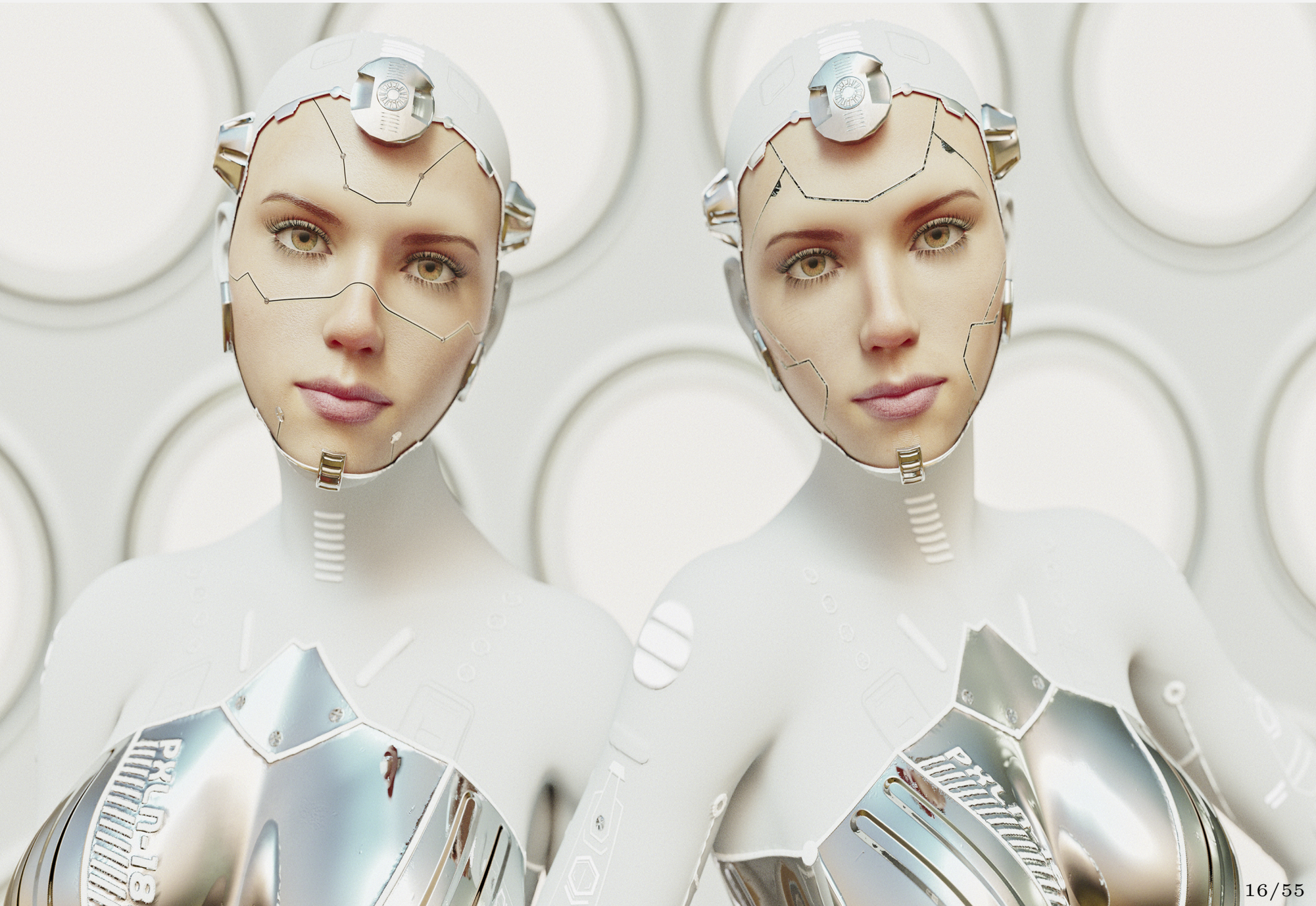
- Vanity and ego-driven research

See: UiO's guidelines on research ethics

Summary: Scientific or Alternative Fact?

- In general, it is difficult to decide what is reliable research
- Scientific articles are evaluated by experts prior to publication (peer review)
  - Provides quality control – but no guarantee
  - Built on tradition, trust, and integrity
  - Small errors are common
  - Fraud and misconduct still occur
- Important in science and society
  - Affects medicine, technology, policy, and public trust
  - Impacts how knowledge is shared and verified
- A potential problem is the incentive structure
  - "Publish or perish" pressure
  - Funding depends on publications and measurable output
  - Rewards fast results over careful verification
  - Encourages questionable research practices

Plagiarism



Definition

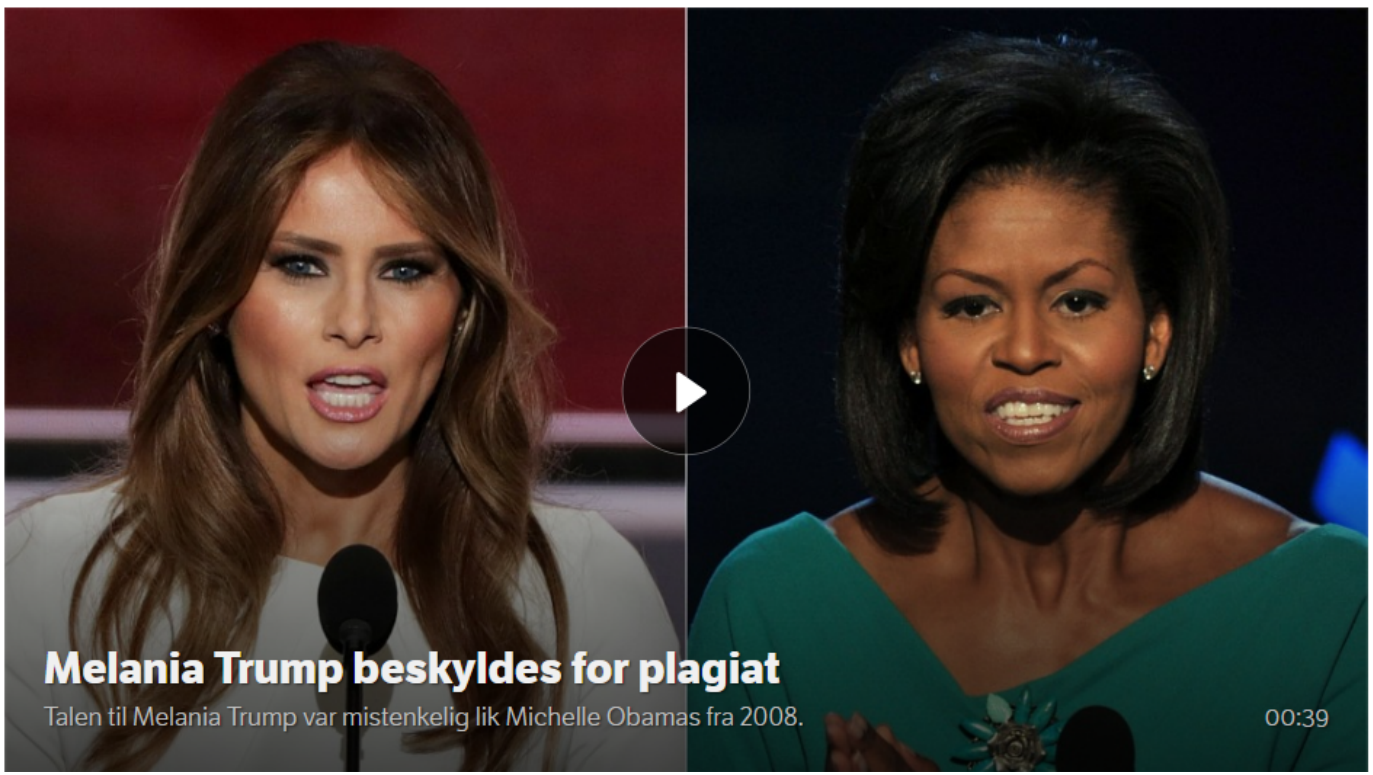
Plagiarism is the representation of another author's language, thoughts, ideas, or expressions as one's own original work.

Wikipedia: Plagiarism



Fru Trump-talen: – Patetisk plagiat

– Dette er berre patetisk, seier retorikkekspert Kjell Terje Ringdal om Melania Trump sin tale i natt. Store delar av talen var lik ein tale Michelle Obama heldt for åtte år sidan.





Eivind Molde
@eivindnrk
Journalist

Publisert 19. juli 2016 kl. 13:57
Oppdatert 19. juli 2016 kl. 14:05

Artikkelen er mer enn to år gammel.



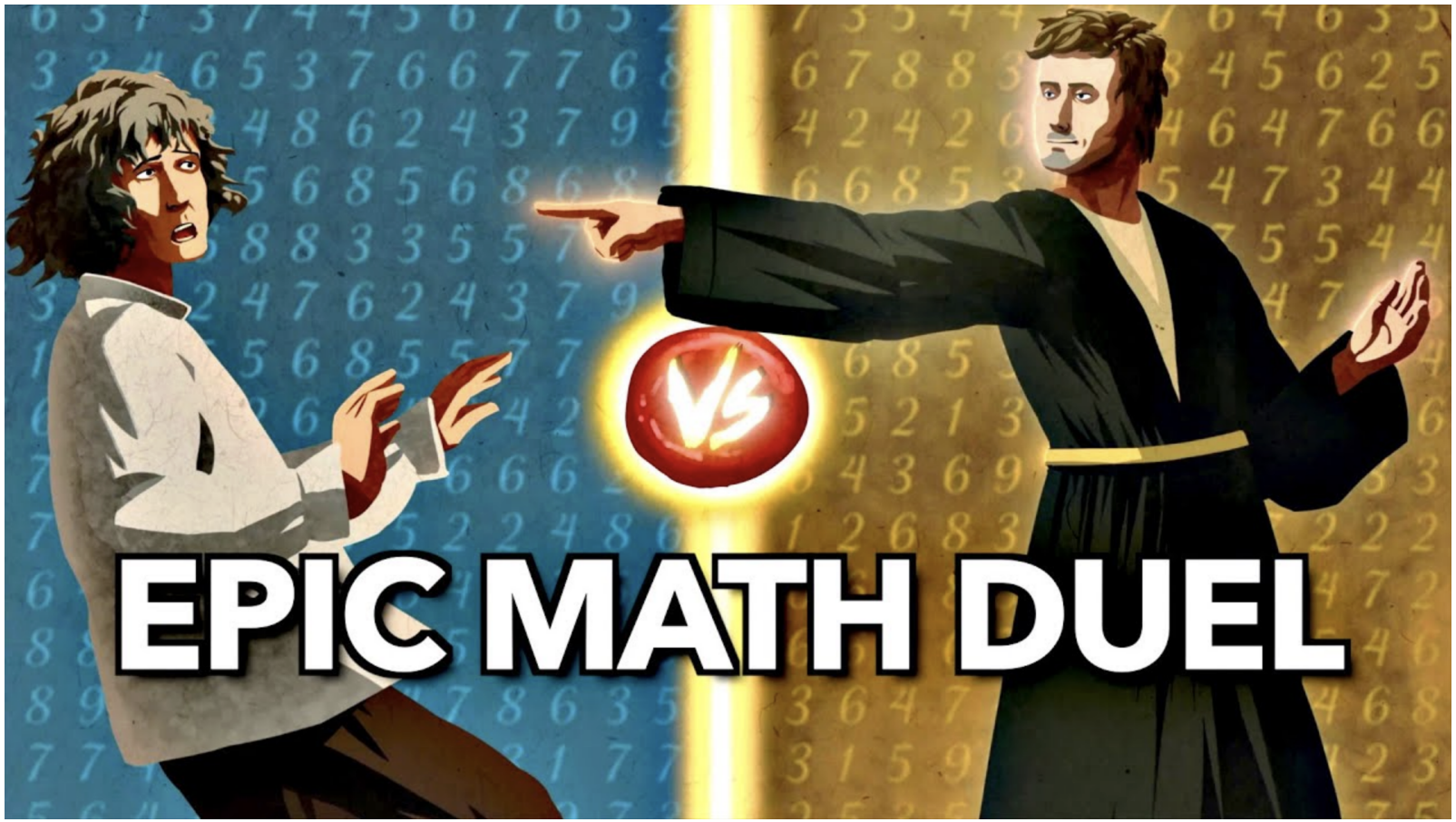
Wiley: 10 types of plagiarism in research

10 Types of Plagiarism in Research

- Verbatim
  - copy/paste without citation
- Complete
  - submitting an entire work as your own
- **Paraphrasing**
  - rewriting text/arguments without citing
- **Secondary source**
  - citing a primary source you did not read
- Invalid / misleading citations
  - citing the wrong source, or sources that do not support the claim
- Replication
  - copying figures, tables, data, or results
- Duplication
  - or self-plagiarism, i.e. reusing your own text/results without disclosure
- Repetitive research
  - "salami slicing": splitting one study into many small publications
- Misleading authorship
  - wrong or unfair author lists (ghost/gift authors)
- Unethical collaboration
  - inappropriate sharing or reuse between collaborators/students

And, **Accidental plagiarism**, forgetting or incorrect citation.

A Plagiarism Example From the 16th Century



Veritasium (YouTube): How Imaginary Numbers Were Invented

Plagiarism Traps in Mathematics

- Standard mathematical style makes it easy to copy wording and structure unintentionally
- Unclear when to cite standard theorems vs. what counts as "common knowledge"
- Some results feel standard but come from specific authors – risk of missing citations
- Your "new" result may be a twist on a known result – must credit the original
- Rewritten proofs following the same idea/structure still need citation
- Small projects relying on few sources can become too close to the original
- Paraphrasing mathematical arguments can change meaning – hard to rewrite without copying

Example: Stealing From the Textbook

Textbook for an introduction to plane algebraic geometry

Bachelor thesis where results are not properly cited



Example: Stealing From the Textbook

Theorem 9.7. *Let F be a reduced curve of degree $n \geq 3$. Let p be the characteristic of K, and assume that either $p = 0$ or $p > n$. Then*

(a) $H_F \equiv 0 \pmod{F}$ *if and only if F is a union of lines.*
(b) *If $H_F \not\equiv 0 \pmod{F}$, then the intersection of F with its Hessian curve consists of the singular points of F and the flexes of F.*
(c) *For every regular point P of F whose tangent line G at P is not a component of F we have*

$$\mu_P(F, G) = \mu_P(F, H_F) + 2.$$

Theorem 4.8. *Let $C = V(F)$ be a curve of degree $n \geq 3$. Let p be the characteristic of k, and assume that either $p = 0$ or $p > n$. Then H_F and H_C have the following properties:*

1. *H_F is a multiple of F if and only if C is a union of lines.*
2. *If H_F is not a multiple of F, then the intersection of C with its Hessian H_C consists of the singular points of C and the flexes of C.*
3. *For every point P of C whose tangent L is not a component of C we have*

$$\mu_P(C, L) = \mu_P(C, H_C) + 2.$$

Example: Stealing From the Textbook

Example 9.8. If one drops the assumption about the characteristic, then the theorem is no longer true in general. Suppose $\operatorname{Char} K = 3$ and $F := X_0^2X_2 - X_1^3$. This curve is irreducible, its singularity $\langle 0, 0, 1\rangle$ is the only point at infinity, and one sees easily that $H_F = 0$.

The regular points of F are the points at finite distance. They satisfy the equation $Y = X^3$. Obviously $(0, 0)$ is a flex of F. For an arbitrary point (a, b) of F at finite distance,

$$Y - X^3 = Y - X^3 - (b - a^3) = (Y - b) - (X - a)^3$$

and therefore (a, b) is also a flex of F.

In contrast to this we have the following.

Corollary 9.9. *Under the assumptions of 9.7 let F be irreducible and let s be the number of singularities of F. Then F has at most $3n(n-2) - s$ flexes.*

Example. The assumption about the characteristic of k can not be dropped easily. Suppose $\operatorname{char} k = 3$, and let $F = X_0^2X_2 - X_1^3$ define the curve C. This curve is irreducible, its only point at infinity is the singularity $(0 : 0 : 1)$, and $H_F = 0$. The regular points are all at finite distance and satisfy $Y = X^3$. Thus we have a proper flex at $(0, 0)$. But even more, any point (a, b) on the curve at finite distance satisfies

$$Y - X^3 = Y - X^3 - (b - a^3) = Y - b - (X - a)^3.$$

Therefore, any regular point is a flex.

Corollary 4.9. *Unter the assumptions of 4.8 let C be irreducible of degree n with s singularities. Then C has at most $3n(n-2) - 2s$ flexes.*

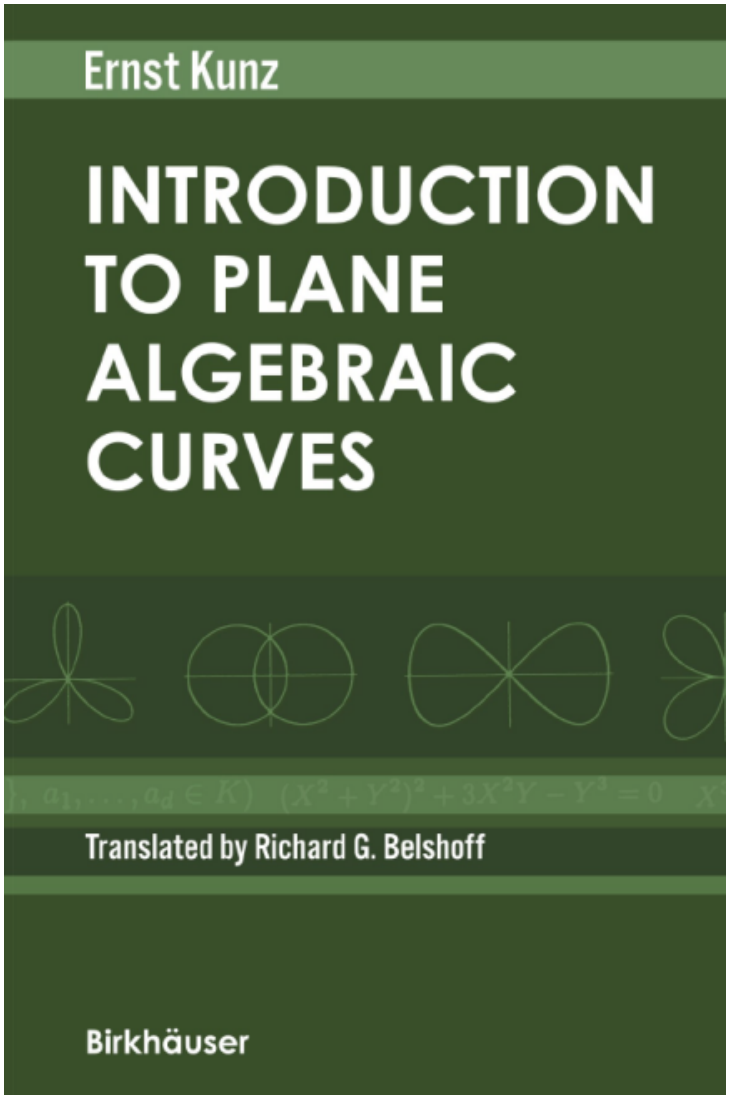
Example: Stealing From the Textbook

- Bachelor thesis where results are not properly cited
- The book is mentioned in the bibliography, but each individual result is not correctly cited
- Rewritten, not copied, results and proofs, but they are not the student's results!
- Even examples are copied – and presented in the same way!

References

[1] Gerd Fischer. *Ebene algebraische Kurven.* vieweg, 1994.

[2] Ernst Kunz. *Introduction to Plane Algebraic Curves.* Birkhäuser, 2005.



Citations and Reference List: Credit, Transparency, and Verification



← Studies ← Examinations

Use of sources and citations

All the assignments you write at UiO must be your own, independent work and the result of your own learning and effort. It is very important that you use sources correctly.

Main rules

Through correct use of sources and citations, you show what you build your knowledge on. Scientific arguments and claims should be open to testing and criticism.

- You may use other people's material as sources of information about your topic and to support and illustrate your line of reasoning.
- All sources should be specified in your assignment, both in the text and in the list of references. This also applies when referring to your own previous work.

Sources can be, for example, data, reasoning and arguments from literature, syllabus, lecture notes, web pages, other students' exam papers or your own previous exam papers.

Cheating

It may be considered cheating or attempted cheating to use other people's material in your assignment without informing about it. It may also be considered cheating or attempted cheating to use your own previous work without informing about it.

Cheating can have serious consequences for you as a student.

https://www.uio.no/english/studies/examinations/sources-citations/

Cheating

You should familiarize yourself with the rules that apply to exam support materials and the use of sources and citations. If you break the rules, you may be suspected of cheating or attempted cheating.

What is considered cheating?

When you write an academic text, you must show what thoughts and reflections are your own and what you have borrowed from others' work. This allows the reader to look up the sources you have used, examine the facts and verify your results.

You may be suspected of cheating or attempted cheating if you:

- do not provide information about sources or give up fictitious sources.
- do not provide information on reuse of your own previous work.
- give the impression that the answer paper is more independent than it actually is.
- have access to or use aids that are not allowed.
- collaborate with others in ways that are not allowed.
- deliver the same answer paper for several exams without it being allowed.
- have unauthorized access to the examination material outside the examination.

You will find information about examination support materials in your course description.

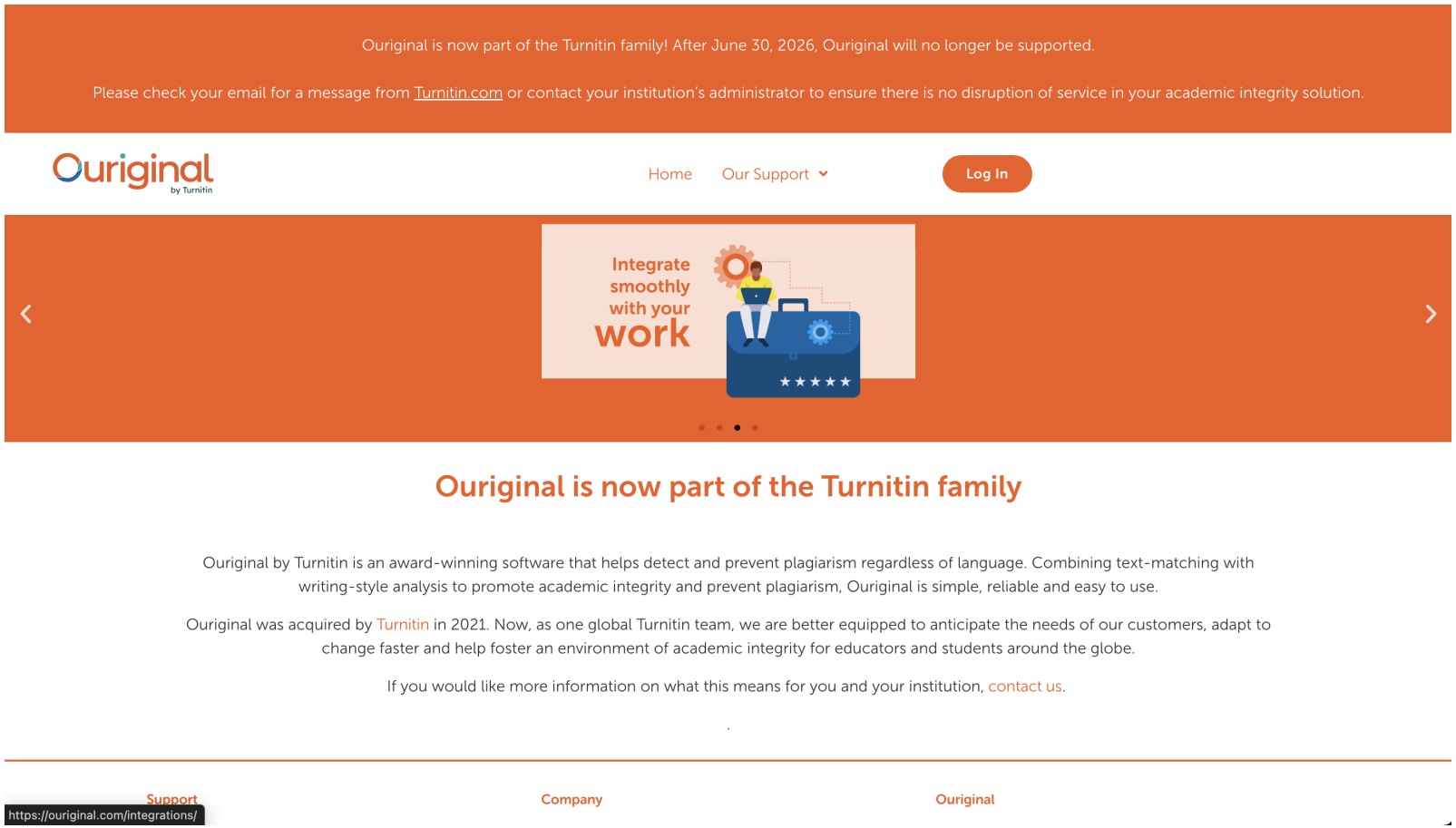
Cheating on assignments

For all types of submissions, you must state the sources and mark the quotations correctly. It is considered as cheating not to state sources or mark quotes correctly.

UiO uses Ouriginal to detect copying in submitted assignments. Ouriginal compares answer papers with online resources, text databases and other submitted assignments.

https://www.uio.no/english/studies/examinations/cheating/

Ouriginal – The System UiO Uses for Control of Plagiarism



UiO: Ouriginal

Sandra Borch (Plagiarism)

Slik ser Øistads tekst fra 2005 ut:

«Enkelte særtrekk ved sikkerhetsreguleringen i petroleumsretten reiser spørsmål i forhold til legalitetsprinsippet. Disse spørsmålene vil jeg komme inn på i slutten av oppgaven. Av fare for «å sprenge» oppgaven vil disse spørsmålene ikke drøftes i den **utrekning** de egentlig fortjener, men det er nødvendig å se på spørsmålene som reiser seg og kort redegjøre for dem.»

Slik ser Borchs tekst ut:

«Jeg vil også drøfte om et funksjonsbasert regelverk reiser også spørsmål i forhold til legalitetsprinsippet. Disse spørsmålene vil jeg komme inn på i slutten av oppgaven. Av fare for «å sprenge» oppgaven vil disse spørsmålene ikke drøftes i den **utrekning** de egentlig fortjener, men jeg ser det som relevant å se på spørsmålene som reiser seg og kort redegjøre for dem.»

Borchs oppgave inneholder også den samme feilstavingen av ordene «tillegg» (tilegg) og «forskriftene» (forskiftene) som i Øistads tekst.

Deler av forskningsministerens masteroppgave: Identisk med tidligere studenters tekster

Masteroppgaven til forsknings- og høyere utdanningsminister Sandra Borch (Sp) inneholder passasjer som er identiske med eldre masteroppgaver fra andre studenter.



Forsknings- og høyere utdanningsminister Sandra Borch (Sp) Foto: Naina Helén Jåma / VG / NTB

E24 article

Ingvild Kjerkol (Self-plagiarism)

Helseminister Kjerkol: – Vi har ikke kopiert, vi har brukt samme metode

Flere setninger i helseministerens masteroppgave fra 2021 er identiske med en annen masteroppgave som ble levert ved samme universitet to år tidligere, uten at den er sitert.



Helse- og omsorgsminister Ingvild Kjerkol svarte direkte i Dagsrevyen på NRK lørdag kveld.

Karoline Johannessen Litland
Journalist
Ola Mjaaland
Journalist
Amanda Iversen Orlich
Visuell journalist
Martin Gundersen
Journalist
Anders Børringbo
Journalist
Fredrik Kampevoll
Journalist
Ingvill Dybfest Dahl
Journalist
Ingvild Bryn

Publisert 20. jan. kl. 17:22
Oppdatert i går kl. 12:44

NRK article

Med forskningsdesign menes planen for gjennomføring av studien (Skilbrei, 2019), og beskriver hvordan vi har gjennomført studien fra idé og tema, utforming av problemstilling og hvordan undersøkelsen er gjennomført. Å lage forskningsdesign innebærer å legge en plan, velge datainnsamlingsmetode, utvalg og dataanalyse som er innafor tidsramma og de ressursene en har (Johannessen et al., 2016). Det er formålet med prosjektet sammen med problemstillinga som legger grunnlaget for metodevalget. Problemstillingen skal ifølge Thagaard (2018) bidra til å gi svar på formålet med studien gjennom å være et spørsmål som avgrenser og er retningsgivende for arbeidet med prosjektet. I tillegg skal problemformuleringen kunne besvares i løpet av studien.

Begrepet "problem" i akademisk forstand er ifølge Justesen og Mik-Meyer (2010) et uttrykk for noe som forskere mangler kunnskap om, eller noe en umiddelbart ikke kan forstå. Problemstillingen skal ifølge Thagaard (2018) bidra til å gi svar på formålet med studien gjennom å være et spørsmål som avgrenser og er retningsgivende for arbeidet med prosjektet. I tillegg skal problemformuleringen kunne besvares i løpet av studien. For oss ble formålet *å utvikle kunnskap om den politiske ledelsesrollen i en 3.0 versjon av kommunen.* Tidligere forskningsarbeid og andre forskeres erfaring rundt hvordan en god problemstilling blir til er lagt til grunn for utvikling av denne studiens problemstilling:

Self-plagiarism at the Universities

Khrono Nyheter Debatt Student Nytt om folk +

FUSK

Minst 90 studenter ute-stengt for selvplagiat. Ett universitet skiller seg ut

Mens Universitetet i Agder har utestengt 37 studenter i saker om selvplagiering, har ikke Universitetet i Tromsø utestengt noen.



Universitetet i Agder er utdanningsinstitusjonen som har utvist flest studenter for å gjenbruke sin egen tekst - såkalt selvplagiat - ifølge Khronos tall. Her fra deres campus i Kristiansand. Tor Erik Schrøder

Khrono article

Khrono Nyheter Debatt Student Nytt om folk +

RETTSSAK

Ble anklaget for å skrive av sin egen eksamen — tapte i retten

Studenten gikk til sak da Høgskolen i Innlandet utestengte henne i to semestre for å ha brukt deler av egen eksamen på en konteeksamen.



En kvinnelig student ved Høgskolen i Innlandet brukte deler av eksamensbesvarelsen på nytt da hun skulle «konte» et fag. Hun ble tatt for fusk og utestengt i to semestre. Foto: Mats Arnesen

Khrono article

Self-plagiarism at the Universities

Khrono Nyheter Debatt Student Nytt om folk +

DEBATT • BJØRN MYSKJA

«Selvplagiering» – hva er problemet?

Hva er forskjellen mellom en forsker som skriver om en artikkel og sender den til ny fagfellevurdering og en student som gjenbruker deler av en eksamen man strøk på, spør professor i etikk og politisk filosofi, Bjørn Myskja.



At HINN får rettslig medhold, viser ikke noe annet enn at dette ikke er den rette arena for å avgjøre slike spørsmål, skriver professor Bjørn Myskja. Foto: Elin Iversen/NTNU

Khrono article

Khrono Nyheter Debatt Student Nytt om folk +

DEBATT • STENSAKER OG STØLEN

Den faglige vurderingen er det viktigste

Det juridiske rammeverket rundt fusk trenger en tydeliggjøring, men de faglige vurderingene kan ikke erstattes av rettssystemet.



Medieoppmerksomheten kan gjøre unge studerende mer bekymret enn godt er - kanskje kan det til og med redusere rekrutteringen til viktige mastergrader, skriver prorektor Bjørn Stensaker og rektor Svein Stølen ved Universitetet i Oslo. Foto: Ketil Blom Haugstulen



Prorektor
Bjørn Stensaker
Universitetet i Oslo



Rektor
Svein Stølen
Universitetet i Oslo

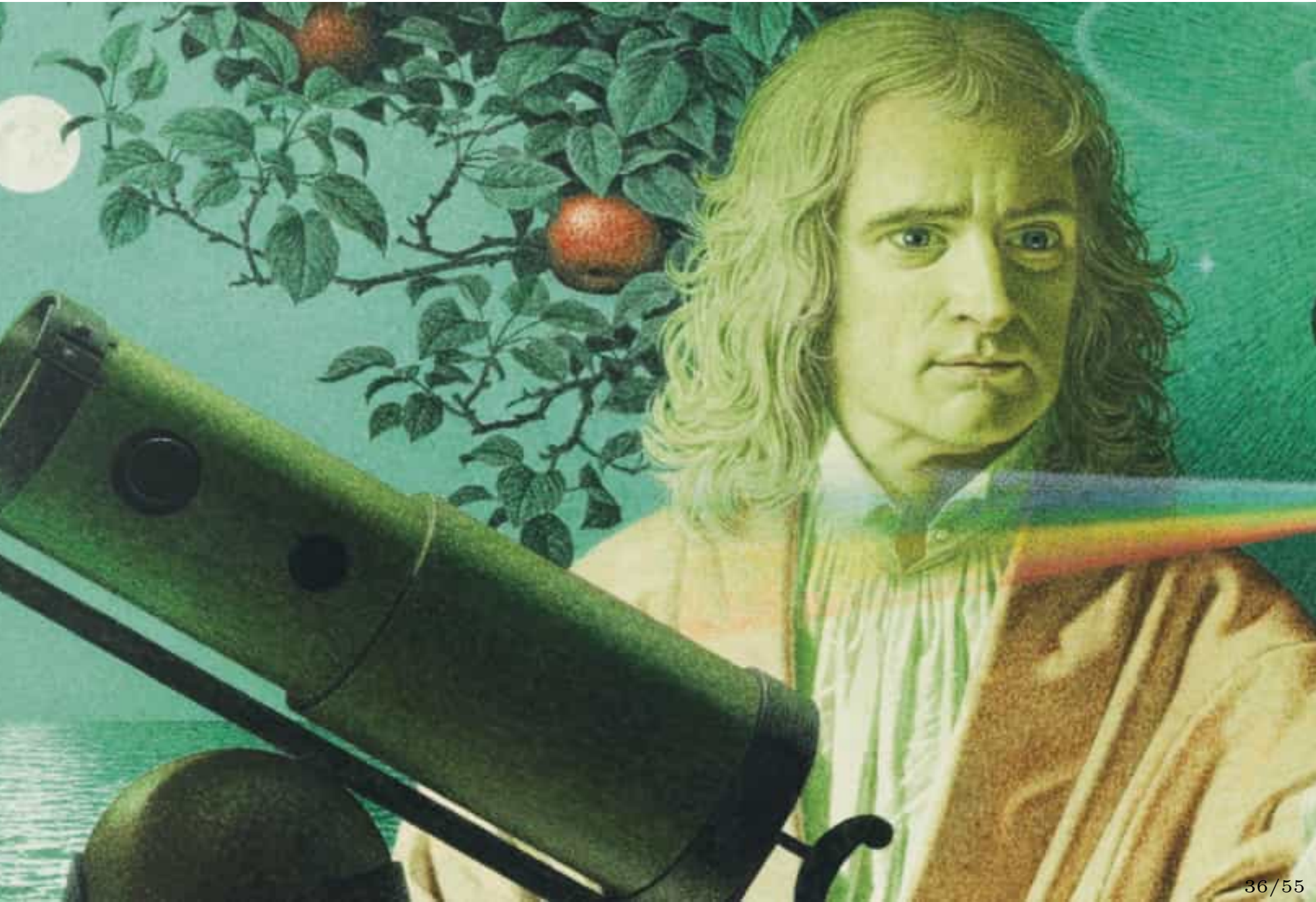
Khrono article

Discussion – Consequences and Context

Discussion questions:

- Is self-plagiarism as serious as plagiarizing others' work?
- Should consequences differ based on when misconduct occurred (as a student vs. established professional)?
- Does intent matter? What if someone didn't know the rules or made an honest mistake?
- When does reusing your own work become problematic? Where is the line?
- What systemic changes could prevent such cases in the future?

If I Have Seen Further it is by Standing on the Shoulders of Giants



Using Sources in a Project

- All results, books, articles, other sources and programs that you use must be cited in the text
- List of references with complete information about your sources at the end of your thesis

The second main result in this article is a formula for the number of sextactic points on cuspidal curves, for which the invariants involved are easily accessible. Indeed, for a cusp p with multiplicity m_p, there exists a unique line T_p such that $l_p = (T_p \cdot C)_p > m_p$, referred to as the tangent line to C at p. Similarly, applicable only to cusps where $l_p = 2m_p$, there exists a, not necessarily unique, conic O_p with $c_p = (O_p \cdot C)_p > 2m_p$ and $c_p \neq 3m_p, 4m_p$, referred to as an osculating conic to C at p, see Lemma 3.2 on page 12.

THEOREM 1.2 (Sextactic point formula). *Let C be a cuspidal curve of genus g and degree $d \geq 3$. Let I denote the set of inflection points and cusps on C where $l_p \neq 2m_p$, and let J denote the set of cusps on C where $l_p = 2m_p$. Then the number of sextactic points s on C, counted with multiplicity, is given by*

$$s = 6(2d + 5g - 5) - \sum_I (4m_p + 4l_p - 15) - \sum_J (10m_p + c_p - 15).$$

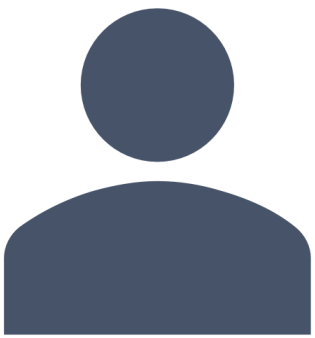
REMARK 1. Although the formula in Theorem 1.2 is a new restriction for cuspidal curves, it is superseded by other well known results.

The formula in Theorem 1.2 has a classical touch and resembles the Plücker formula for inflection points; see [3, p. 586] for a formula for curves with any kind of singularities, attributed to Weierstrass and Noether.

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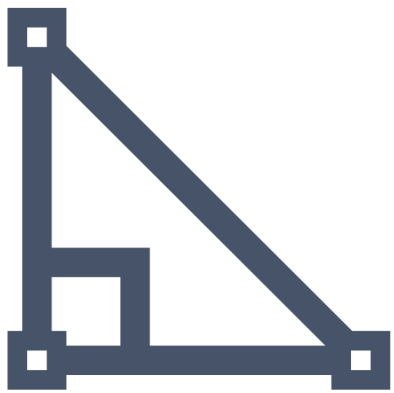
Give Credit to the Right Person



What have you done yourself?



What has been done by others?



What is well known?

Key Principles for Citations

When using others' work, ask yourself:

- Who made it?
- Why do you include it?
- How do you use it?
- Where can the reader find it?

Essential practices:

- Provide proper citations in text
- Include complete reference list
- Make your own contribution explicit
- Cite to give credit and avoid plagiarism

Remember: Your own contribution is what matters most!

Where it appears

- Results and claims should be supported by:
  - Your own mathematical argument
  - A citation of a result by someone else
- Where do we cite?
  - Introducing a paragraph or sentence
  - After a claim – at the end of sentences or paragraphs
  - In theorems, propositions, and so on
- Different kinds of citations:
  - The entire source
  - Specific results
  - Quotes are rare
  - Paraphrased content

How it appears (BibLaTeX)

- Different styles (every journal has a preferred style):
  - numeric [1]
  - alphabetic [Bor17]
  - authoryear (Borgan, 2017)
- General citations without page numbers:
  - [1] or [Bor17]
  - Borgan in [Bor17]
- Specific results with numbering or page numbers:
  - Maugesten and Moe [MM17, Theorem 1.1]
  - Maugesten and Moe [MM17, p. 12]
  - Maugesten and Moe [MM17, pp. 12–15]

Illustrations

- Pictures, figures, graphs, tables, and drawings belong to someone
- Always respect copyright
- Check license (CC-BY, Public Domain, etc.)
- Ask for permission to use them
- Cite them correctly
- You may recreate graphs and figures:
  - Recreate so it conveys your own message
  - Cite the source/data/software you use



Reference List

- Detailed information about all sources cited in the text
- Enough information to find exactly the text that has been used
- Surjective:
  - Only these sources – no more, no less
- Proofread the reference list!
- Reveals the context of your work:
  - What field and topics you engage with
  - The academic level (textbooks vs. research papers)
  - What foundation you build upon (where it comes from)
  - What direction you contribute to (where it goes)
  - Helps readers and yourself get an overview

Reference List – Technical Details

- Metadata
- Information about the material
- Book:
  - Author, title, publisher, place and year
- Article:
  - Author, title, journal, volume, year, page numbers
- Web pages:
  - Author, title, address, visiting date
- arXiv-articles have their own set of rules

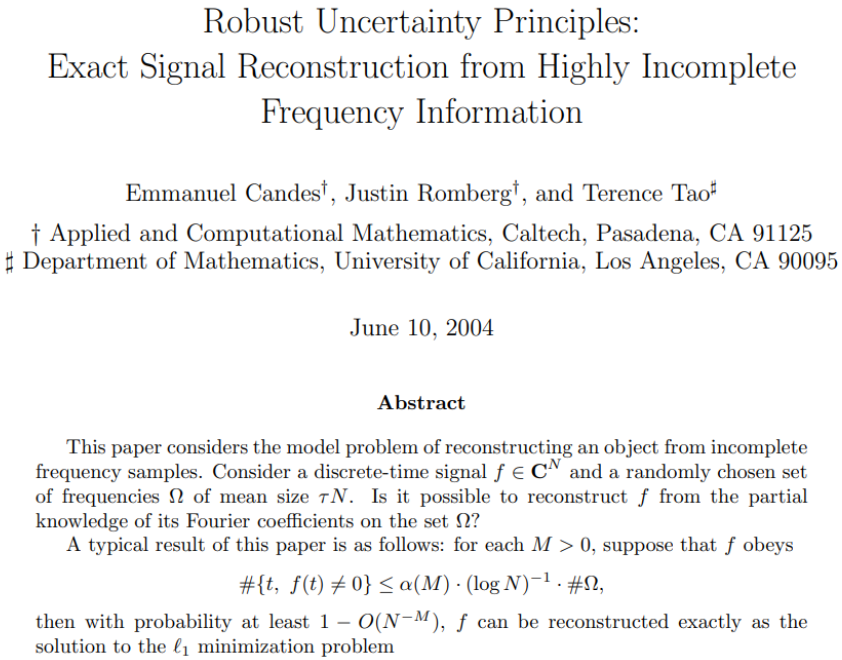
Verifiable Research

- Main point with citations and the reference list is that the reader should be able to check and recreate or verify your results
- Always use the source in front of you!
- Be precise, beware of editions, pre-prints etc.
- Use the primary source
- If you don't have the primary source or it cannot be used, cite the statement about the result **in the secondary source** that you have in front of you!



arXiv vs. Published Articles

- **arXiv:** A preprint (often not peer-reviewed yet) and can be updated with new versions
- **Published article:** Peer-reviewed and formally published as the final "version of record" (fixed citation/DOI)



Robust Uncertainty Principles:
Exact Signal Reconstruction from Highly Incomplete Frequency Information

Emmanuel Candes†, Justin Romberg†, and Terence Tao♯

† Applied and Computational Mathematics, Caltech, Pasadena, CA 91125
♯ Department of Mathematics, University of California, Los Angeles, CA 90095

June 10, 2004

Abstract

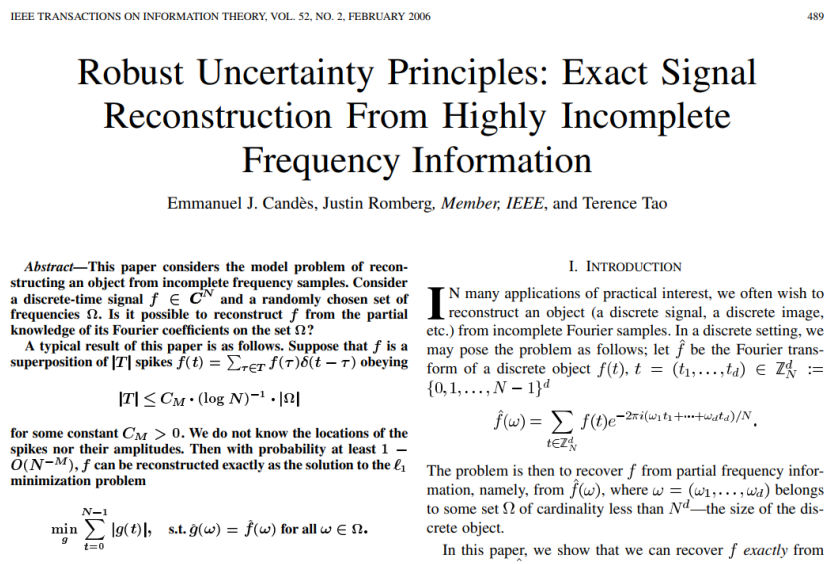
This paper considers the model problem of reconstructing an object from incomplete frequency samples. Consider a discrete-time signal $f \in \mathbf{C}^N$ and a randomly chosen set of frequencies Ω of mean size τN. Is it possible to reconstruct f from the partial knowledge of its Fourier coefficients on the set Ω?

A typical result of this paper is as follows: for each $M > 0$, suppose that f obeys

$$\#\{t,\ f(t) \neq 0\} \leq \alpha(M) \cdot (\log N)^{-1} \cdot \#\Omega,$$

then with probability at least $1 - O(N^{-M})$, f can be reconstructed exactly as the solution to the ℓ_1 minimization problem

arXiv preprint



IEEE TRANSACTIONS ON INFORMATION THEORY, VOL. 52, NO. 2, FEBRUARY 2006

Robust Uncertainty Principles: Exact Signal Reconstruction From Highly Incomplete Frequency Information

Emmanuel J. Candès, Justin Romberg, *Member, IEEE*, and Terence Tao

***Abstract*—This paper considers the model problem of reconstructing an object from incomplete frequency samples. Consider a discrete-time signal $f \in \mathbf{C}^N$ and a randomly chosen set of frequencies Ω. Is it possible to reconstruct f from the partial knowledge of its Fourier coefficients on the set Ω?**

A typical result of this paper is as follows. Suppose that f is a superposition of $|T|$ spikes $f(t) = \sum_{\tau \in T} f(\tau)\delta(t-\tau)$ obeying

$$|T| \leq C_M \cdot (\log N)^{-1} \cdot |\Omega|$$

for some constant $C_M > 0$. We do not know the locations of the spikes nor their amplitudes. Then with probability at least $1 - O(N^{-M})$, f can be reconstructed exactly as the solution to the ℓ_1 minimization problem

$$\min_g \sum_{t=0}^{N-1} |g(t)|, \quad \text{s.t. } \hat{g}(\omega) = \hat{f}(\omega) \text{ for all } \omega \in \Omega.$$

I. Introduction

In many applications of practical interest, we often wish to reconstruct an object (a discrete signal, a discrete image, etc.) from incomplete Fourier samples. In a discrete setting, we may pose the problem as follows; let $\hat{f}$ be the Fourier transform of a discrete object $f(t)$, $t = (t_1, \ldots, t_d) \in \mathbb{Z}_N^d := \{0, 1, \ldots, N-1\}^d$

$$\hat{f}(\omega) = \sum_{t \in \mathbb{Z}_N^d} f(t) e^{-2\pi i(\omega_1 t_1 + \cdots + \omega_d t_d)/N}.$$

The problem is then to recover f from partial frequency information, namely, from $\hat{f}(\omega)$, where $\omega = (\omega_1, \ldots, \omega_d)$ belongs to some set Ω of cardinality less than N^d—the size of the discrete object.

In this paper, we show that we can recover f *exactly* from

Published version

Some Special Problems in Mathematics

- Level on what you write vs. level on the source
- A result that covers a more general case than you are working with
- Common to make changes / paraphrase
- But you still have to acknowledge the original work!
- Notation must be consistent!
- Different notations must be merged
- Declare notation early on and in running text
- “In our notation, the theorem says. . . ”

Choosing Notation

1

Definition [edit]

The Hirzebruch surface Σ_n is the $\mathbf{P}^1$ bundle over $\mathbf{P}^1$ associated to the sheaf

$$O(0) + O(-n).$$

The notation here means: O(n) is the n-th tensor power of the Serre twist sheaf O(1), the invertible sheaf or line bundle with associated Cartier divisor a single point. The surface Σ_0 is isomorphic to $\mathbf{P}^1 \times \mathbf{P}^1$, and Σ_1 is isomorphic to $\mathbf{P}^2$ blown up at a point so is not minimal.

2

Let H be any ample class on the Hirzebruch surface $\mathbb{F}_e = \mathbb{P}(\mathcal{O}_{\mathbb{P}^1} \oplus \mathcal{O}_{\mathbb{P}^1}(e))$, $e \geq 0$.

3

2.1. **Hirzebruch surfaces.** Let X_e, $e \geq 0$, be a Hirzebruch surface, regarded as a projectivisation of a rank 2 bundle $\mathcal{O} \oplus \mathcal{O}(-e)$ over $\mathbb{C}P^1$. Let L be a fibre and M_0 the special section, so that the intersections and self–intersections are as follows:

$$L^2 = 0, \ M_0^2 = -e, \ L \cdot M_0 = 1.$$

A Digression: Numbering and Cross References

- Numbering
  - Chapters, sections, figures, tables, theorems, lemmas and so on should be numbered
  - Equations and formulas that you use in different places in the text need a number
  - Central equations and formulas should have a number so that others can cite them
- What is cross references?
  - A way to connect different parts of the text using numbers
- Why use cross references?
  - Helps the reader navigate in your project
  - Use `\usepackage[hidelinks]{hyperref}` for digital navigation
  - Makes your project citeable!

The second main result in this article is a formula for the number of sextactic points on cuspidal curves, for which the invariants involved are easily accessible. Indeed, for a cusp p with multiplicity m_p, there exists a unique line T_p such that $l_p = (T_p \cdot C)_p > m_p$, referred to as the tangent line to C at p. Similarly, applicable only to cusps where $l_p = 2m_p$, there exists a, not necessarily unique, conic O_p with $c_p = (O_p \cdot C)_p > 2m_p$ and $c_p \neq 3m_p, 4m_p$, referred to as an osculating conic to C at p, see Lemma 3.2 on page 12.

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REMARK 1. Although the formula in Theorem 1.2 is a new restriction for cuspidal curves, it is superseded by other well known results.

The formula in Theorem 1.2 has a classical touch and resembles the Plücker formula for inflection points; see [3, p. 586] for a formula for curves with any kind of singularities, attributed to Weierstrass and Noether.

How to Avoid Plagiarism

- Cite!
- It is always OK to cite (the source you have in front of you)!
- It is never OK to copy theorems, proofs etc., even in rewritten form, without citing!
- Self-plagiarism is still plagiarism, so you must cite!
- Make sure the motivation, introduction and presentation of the results, examples and proofs are independent of your sources
- Draw your project's story on a sheet of paper
- Read the source, put it away and write what you want to include in your own words

Example: Stealing From the Textbook

Textbook for an introduction to plane algebraic geometry

Bachelor thesis where results are not properly cited



Example: Stealing From the Textbook

You may include a theorem by someone else (modified to your notation) in your project if you CITE the source!

Theorem 9.7. *Let F be a reduced curve of degree $n \geq 3$. Let p be the characteristic of K, and assume that either $p = 0$ or $p > n$. Then*

(a) *$H_F \equiv 0 \pmod{F}$ if and only if F is a union of lines.*
(b) *If $H_F \not\equiv 0 \pmod{F}$, then the intersection of F with its Hessian curve consists of the singular points of F and the flexes of F.*
(c) *For every regular point P of F whose tangent line G at P is not a component of F we have*

$$\mu_P(F, G) = \mu_P(F, H_F) + 2.$$

Theorem 4.8. *Let $C = V(F)$ be a curve of degree $n \geq 3$. Let p be the characteristic of k, and assume that either $p = 0$ or $p > n$. Then H_F and H_C have the following properties:*

OK if cited properly

1. *H_F is a multiple of F if and only if C is a union of lines.*
2. *If H_F is not a multiple of F, then the intersection of C with its Hessian H_C consists of the singular points of C and the flexes of C.*
3. *For every point P of C whose tangent L is not a component of C we have*

$$\mu_P(C, L) = \mu_P(C, H_C) + 2.$$

Example: Stealing From the Textbook

You may NOT copy or paraphrase environment by environment from someone else in your project EVEN IF YOU CITE the source!

Example 9.8. If one drops the assumption about the characteristic, then the theorem is no longer true in general. Suppose $\operatorname{Char} K = 3$ and $F := X_0^2X_2 - X_1^3$. This curve is irreducible, its singularity $\langle 0,0,1\rangle$ is the only point at infinity, and one sees easily that $H_F = 0$.

The regular points of F are the points at finite distance. They satisfy the equation $Y = X^3$. Obviously $(0,0)$ is a flex of F. For an arbitrary point (a,b) of F at finite distance,

$$Y - X^3 = Y - X^3 - (b - a^3) = (Y - b) - (X - a)^3$$

and therefore (a,b) is also a flex of F.

In contrast to this we have the following.

Corollary 9.9. *Under the assumptions of 9.7 let F be irreducible and let s be the number of singularities of F. Then F has at most $3n(n-2) - s$ flexes.*

Example. The assumption about the characteristic of k can not be dropped easily. Suppose $\operatorname{char} k = 3$, and let $F = X_0^2X_2 - X_1^3$ define the curve C. This curve is irreducible, its only point at infinity is the singularity $(0:0:1)$, and $H_F = 0$. The regular points are all at finite distance and satisfy $Y = X^3$. Thus we have a proper flex at $(0,0)$. But even more, any point (a,b) on the curve at finite distance satisfies

$$Y - X^3 = Y - X^3 - (b - a^3) = Y - b - (X - a)^3.$$

Therefore, any regular point is a flex.

Corollary 4.9. *Unter the assumptions of 4.8 let C be irreducible of degree n with s singularities. Then C has at most $3n(n-2) - 2s$ flexes.*

Summary Citations I

- All claims must be verified either by a mathematical argument or a citation
- Citations appear:
  - At the beginning of paragraphs, sentences or claims
  - After a claim or at the end of a sentence
  - Before or in parenthesis next to a result
- Mention the last name of the author(s) at least the first time the source is used
- If you build your research on someone's work and only tweak some assumptions, specify this with a citation and explicitly state the changes you make
- In mathematics, citations are rarely direct quotations with quotation marks (due to notation/level changes)

Summary Citations II

- Use primary sources and published versions as much as you can
- It is common to cite textbooks (not necessarily primary sources) for well-known results
- Some results are so well known they need no citation (e.g. Pythagoras' theorem)
- If you cite a specific result, include environment and number in the citation
- If you do not cite a specific result, it is expected that you provide a proof and that it is your own
- OK to cite an entire paper as background, but specific results must be cited specifically
- Never copy the structure of someone else's text
- Do not cite people unless you actually use their research – citations must serve a purpose