US-China Education Review B, February 2015, Vol. 5, No. 2, 123-132
doi: 10.17265/2161-6248/2015.02.007

# No Country for Old Mathematicians

Tim Horvat
Gimnazija Bežigrad, Ljubljana, Slovenia

The paper presents a theatre play with mathematical content. It was written for the Le-Math project, specifically for the MATHeatre competition held in Cyprus by the Cyprus Mathematical Society. The intended value of this play is communicating important mathematical ideas and concepts through an interesting theatre play, enhancing the learning experience and making it easier to comprehend creating mathematical proofs. Above all, the eternal philosophical dilemma in mathematics is present in the play: What is the role of computers? The most advanced computer in the human history is created and launched by an American millionaire, proves the Fermat's Last Theorem in an hour and begins to struggle with the "strong" Goldbach conjecture. A conference is held by the president of a fictional International Mathematical Society, where he and other revered mathematicians discuss the issue, drawing some radical conclusions. In the final act, three young mathematicians arrive to the computer and challenge it to solve the Goldbach's conjecture. Through this play, the participants spread the knowledge on mathematical proofs, the history of number theory, some of the famous conjectures (and theorems), and overall, the idea of a mathematician's life and mentality.

*Keywords:* theatre, school, mathematics, Goldbach's conjecture

## Introduction

The purpose of this article is to illuminate the aspects of the production of a theatre play called "No Country for Old Mathematicians". Mathematics plays an important role in the nowadays society, yet it does not play a significant role in the pop culture. It is often regarded as complicated, useless, or boring. The author of this play coped with the problem, writing a theatre play with mathematical content and highlighting some of the most notorious (and simple) mathematical problems: Fermat's Last Theorem and Goldbach's conjecture. The performance presented those mathematical problems in an attractive and interesting way, actually resembling Hollywood films. It had a positive effect on all actors who educated themselves on mathematics and improved their English skills, and also students who watched the performance, obtaining new pieces of information and maybe got to like mathematics more.

## MATHeatre

In June 2013, at the end of the author's first year of secondary school, the author was informed by his mathematics professor Ms. Jasna Kos about an international competition called the MATHeatre. It would be held in Cyprus in April 2014. The competition was a part of the Le-Math project co-financed by the European Office of Cyprus and the Thales Foundation. The subtitle of the project was "Learning mathematics through new communication factors". The purpose of MATHeatre was "teaching and learning mathematics through

Tim Horvat, middle school student, Gimnazija Bežigrad.

math theatre activities". In plain words, the purpose was to present mathematical problems and dilemmas through interesting, entertaining theatre plays. It seemed like a mission impossible at first to take a dull mathematical problem and make something enjoyable, viewable out of it!

## Making of a Plot

The author has had a lot of experience with writing before, having written two novels and a number of novellas. A slight aggravation nonetheless was writing in English, yet it was a challenge that proved to be educative for the author, too.

It took more than two months to come up with an idea. Upon rereading the famous *Hitchhiker's Guide to the Galaxy*, the author stumbled upon the computer Deep Thought from the novel. He developed an idea and suddenly draft of a computer, so advanced and so intelligent, that it could solve mathematical problems on its own. This seems like science fiction even today. However, the Four Colour Theorem was proved with a computer. It took a thousand hours of computer time and the results were published on 450 pages, showing all 1,482 configurations. It was an amazing *tour de force*, but the wider mathematical community reacted with fair disappointment, not at the result or the computational achievement, but at the method. "A proof is a story whose plot convinces you the statement is true. But this story didn't have a plot. Or if it did, there was a big hole in the middle" (Stewart, 2013, p. 76). Proving conjectures with a computer is still a great aggravation, because one needs to translate the language of the problem into the computer language, which is still a marvellous achievement. Yet, in that moment, the author imagined a radically different computer, the next gen, fully advanced artificial intelligence, capable of actually proving a conjecture like a human. As an homage to one of the biggest works of science fiction, to which this play is strongly connected, the computer is named "Hal", after the computer aboard spaceship discovery in Clarke's (1968) *2001: A Space Odyssey*. Like the name of the computer, the title of the play was inspired by a famous novel *No Country for Old Men* (McCarthy, 2005), discussing changes and progress Texas had undergone, just like the world of mathematics with the new computer.

The philosophical dilemma, needed for a theatre play, was born—What is the role of computers (and humans) in mathematics? Should computers become more intelligent than humans? As it is uttered in the play: "And maybe won't be discovered by man (conjectures and theorems), because they can't be discovered by man. (…) So should we even grasp at them? We are putting us in a position far superior to what was meant for us". The play juxtaposes two opposing stances and provides neither an author's opinion nor a solution. Furthermore—the dialogues—through which the author discussed this conflict, could never be so strong or effective and dramatic in a novel. Through the theatre, everything came out bigger and more far-reaching.

While searching for famous mathematical problems which could be used in the play, the author was suggested by his professor the Goldbach's conjecture and the Fermat's Last Theorem. Consequently, the novel *Uncle Petros and the Goldbach's Conjecture* by Doxiadis (1992) and the book *The Fermat's Last Theorem* by Singh (1997) were used for providing background information on the topic. The two novels were both very informative and inspiring, but on the other hand, presented another important aspect of mathematics—the life of an ambitious, genius mathematician: his mind, his eagerness, and his fear of aging. "By the age of 30, a mathematician must have achieved everything he could or wanted" (Doxiadis, 1992). This motif was presented in the play by Fred Euler and Stark's uncle.

The project also tried to show a generation conflict, where the older generations of mathematicians try to stop progress, because they fear becoming “obsolete”, losing control of researching the vast fields of unknown, especially in the number theory, where a computer comes in as a very useful tool. On the other side, there are three young bright mathematicians, “the brightest of our kind”, who do not fear computers—they want to see if they can beat it, and eventually give in, should they fail. They have a more liberal view on progress, contrary to the guardians of the mathematical community, who try to stop potential great leaps forward at any cost.

## Educational Impact

Organising this whole project had a positive influence on all participants. Firstly, the actors had to understand the play, the story, and the mathematics behind, in order to be able to identify themselves with the characters.

Secondly, not only did the participants learn about mathematical content, they got to understand how theatre production works. They had to find appropriate costumes and theatre props. A very important element of the performance was also the video projection in the background. The author and other actors cooperated with a student who mastered Adobe Photoshop and some other video editing software, so, in this way, he learned some skills, too. He provided us animations of the Fermat’s Last Theorem and the Goldbach’s conjecture, which proved to be of great importance for the audience to fully comprehend the equations and conjectures uttered on stage.

Furthermore, the actors played with the accents (German, American, British, Indian, French, Russian, and Japanese), which was on one hand very amusing, but on the other hand also a fair challenge for everyone. In this way, the play was not just useful for mathematics, but also learning English, since the characters (especially the protagonists) had quite some text to learn by heart.

Finally, the play was performed in many different classes and had lectures prepared about the two famous mathematical problems in the play. In this way, all students in class had at least a vague idea of the two problems, which the author chose with help from his professor Ms. Jasna Kos for their simplicity and ease of comprehension, before seeing the play.

But the main part of the content in this play is the very mathematical proof. This performance is actually a result of extended work on mathematical proofs. Students learn about the sense of the proof in the first year of the school, when studying about the number theory. The first step is to understand that it is not enough to substitute variables for numbers. To prove something means to use axioms and deductive reasoning to explain why a statement is true without having to check every number. “Mathematicians aren’t satisfied because they know there are no solutions up to four million or four billion, they really want to know that there are no solutions up to infinity”, Andrew Wiles (1996) said in a BBC documentary with the title *The Fermat’s Last Theorem.*

Through the play, which by animations, striking dialogues, and dramatic music, sometimes resembled a Hollywood movie, the students remembered conjectures and theorems from the number theory much faster and with bigger ease. They also understand the historic development of the number theory and at the end separate a conjecture from a theorem.

Throughout the process of creating the performance, mathematics proved to be not only easy, but also intense, amusing, and fun. The following text is an unabridged version, because the participants had to make a performance up to 12 minutes in length. A lot of texts were erased or shortened and “rationalised”, which actually resulted in the mathematical part being even more emphasized.

## Major Performances

The theatre play was performed at an international conference of Technology and Its Integration in Mathematics Education (TIME) 2014, which took place in Krems, Austria, from 1st to 5th July 2014. The play will also be performed on the 14th International European Council for High Ability Conference taking place in Ljubljana, from 17th to 20th September 2014.

**Roles (In Order of Appearance)**

Robert Stark: An enthusiastic American billionaire, returning as a lost child after his withdrawal from the mathematical community, striving for progress at any cost;

Hal: A holographic projection of Stark's quantum computer, an emotionless and utterly rational character;

Fred Euler: A revered, conservative, and determined German mathematician, the president of the International Mathematical Society with a rather mysterious past;

Gupta Ramanujan: A calm and open-minded Indian mathematician;

Adam Johns: An apocalyptic and hot-tempered American mathematician from Texas;

Jane Maxwell: A very conservative yet reserved British mathematician;

Akira Mochizuki: A young and brilliant Japanese mathematician;

Nicole Poincaré: A cunning French mathematician;

Irina Perelman: The possible Russia's next winner of the Fields Medal.

**Act One**

(Scene one)

Stark: Euler, hey, Euler! At last, I have done it!

After years of spending mind-blowing amounts of money, I have successfully launched the most advanced computer in the human history. With its cutting-edge possibilities, it will push borders of modern maths into the unknown.

The Earth looks so small from up here. The computer was too big to be built on the ground, so every bit had to be brought in the orbit and carefully put together.

Do not call me crazy, Fred. Somebody had to do this. And I'm not that of a freak, I have prepared a convenient hologram to communicate with. It is as if I spoke to a real person, and a very smart one, I must say, and not to the most advanced computer in the history of the universe! (A loud beep) Just a second. It is just begun exploring natural numbers. Presumably, in 30 minutes, it will discover the basics of geometry including the Pythagorean Theorem.

It is called … I have not got a name yet … Fred, are you still there? Hello?

(The sound of a telephone hung up.)

(Scene two)

Stark: (Claps his hands) Hey!

Hal: You called me, sir?

Stark: I must admit you are a handsome hologram.

Hal: Indeed, sir. I believe I correspond the most beautiful specimens of your kind. But may I ask you something? What shall my name be?

Stark: I have spent quite some time about your name … Hal.

Hal: Well, that's a funny name.

Stark: Sorry, I made you and I named you (Laughs).

You began your work two and a half hours ago. From the moment, I set up five Peano axioms you began exploring the natural numbers and the most primitive correlations. Where are you now?

Hal: I have just solved a very interesting problem which states that no three positive integers, *a*, *b*, and *c*, can satisfy the equation $a^n + b^n = c^n$ for any integer value of *n* greater than 2, which I have proved to be true in 78 minutes and 17 seconds.

Stark: (Gazes blankly, catching a breath, combs his hair with a hand) Are you serious?! You have solved the Fermat's Last Theorem!

Hal: I am running a search on Fermat. … Pierre de Fermat, born on 17 August 1601 and died on 12 January 1665, was a French lawyer at the Parlement of Toulouse, France, and an amateur mathematician who is most recognized for discovering an original method of finding the greatest and the smallest ordinates of curved lines and his research into number theory. He is best known for the so-called Fermat's Last Theorem you had mentioned, which he described in a note at the margin of a copy of Diophantus' Artihmetica.

Stark: And the problem states—

Hal: —In number theory, Fermat's Last Theorem states that no three positive integers, *a*, *b*, and *c*, can satisfy the equation $a^n + b^n = c^n$ for any integer value of *n* greater than 2. Which I have proved to be true, as I said.

Stark: This was one of the most protruding problems of mathematics!

Hal: Was?

Stark: Mathematicians had been resolutely trying to prove it for almost four hundred years! Fermat claimed to have found a proof in 1637 but was too large to fit in the margin. Three hundred and fifty-eight years had to pass for the problem to be solved. In 1995, Andrew Wiles finally brought a solution after centuries of wandering in the dark and after hundreds of failed attempts.

Hal: I will have to catch up with your human culture and imperfections.

Stark: I will let you continue your explorations. You have to prove first that you can solve problems like a human instead of a computer and then jump headfirst into complex maths. Hopefully one day you will be able to prove the Goldbach's conjecture …

Hal: I will keep everyone informed over my new Twitter account. The Goldbach's conjecture, hmmm …

## Act Two

### (Scene one)

Euler: *Meine Damen und Herrn*, dear colleagues, listen up! I have called this meeting due to extraordinary occurrences which have very recently taken place. I must warn you all that what will be revealed here, must stay behind closed doors.

Gupta: Get to the point, Euler! We do not have a whole day. Some of us actually do real maths for living …

Euler: Hold your horses, Gupta. … This morning, three and a half hours ago, I received a surprising phone call. It was Robert Stark.

All together, except for Euler: Robert Stark? That lunatic? Robert Stark? What happened to that guy? Did not he die or something?

Euler: No, after his revered uncle … died, he marginalised himself, went someplace isolated, and now, he was prepared a strike-back.

Johns: What do you mean? Sounds like there is gonna be some bad news.

Euler: (Nods, with a bitter voice) He called me and claimed with a trembling voice that he had the most advanced computer in human history. The so called quantum computer. He wants to explore maths with it.

Johns: Oooh-kay.

Gupta: And where exactly is this computer? Did he build it in secrecy? Underground?

Euler: That is the peculiar part—he is in space. In a low orbit, to be exact. The computer—it is so bulky and massive that it could not be made on the ground.

Gupta: I knew he was a millionaire ... And I knew he was a philanthropist. But never would I have imagined that he had something so … so remarkable in his brain.

Jane: What? But when did he manage to do that?? Darn it, I am desperate to get a cup of tea.

Euler: I was surprised to hear this news, too, but it must have started just this morning, no sooner. And about the secrecy—money can obviously buy everything.

Johns: What are his intentions, pal? What's he gonna do with the computer?

Euler: He plans to explore the universe of mathematics without further human involvement. I quote.

Jane: Without any human involvement? But …

Gupta: Just a second, he made a computer that could solve all yet unsolved problems? Just like that? (Snaps his finger.)

Euler: Just like that, I guess.

Gupta: This is perfect, we could solve some yet unsolved problems, for instance, whether there are any odd perfect numbers and search for new ones …

Euler: Positive integers that are equal to the sum of their proper positive divisors, like 6, 28 …?

Johns: C'mon, are there any results yet? Caus' unconfirmed rumors ain't of no use.

Euler: Just a couple of hours ago, he proved the Fermat's Theorem in 78 minutes of analytical operations. The machine published the news on Twitter.

Johns: Shit. Shit, shit!

Jane: I am a bit conflicted. He would push the borders of mathematics into the unknown, right? But at the same time … even though we needed 200 years to solve it, we solved it. But now …

Johns: There are problems, theorems, and conjectures that need to be discovered first!

Gupta: And maybe won't be discovered by man, because they can't be discovered by man.

Euler: So should we even grasp at them? We are putting us in a position far superior to what was meant for us.

Gupta: This computer is an ordeal. It will prove whether we are developed enough to become something more, to achieve something more, or to have an impact on the universe.

Johns: Oh, cut the crap, Gupta, right now, this computer only means trouble! Its IQ is to damn high. We cannot cope with it. It is a threat not only to national, but also world security! We will have Matrix and Terminator in reality!

It must be stopped as soon as possible. But I think we have time. Solving the Fermat showed how long it took—quite some time, pals, quite some time. … We have time to find a solution to this.

Gupta: Hey, everyone! Calm down! You are overreacting—no turning point has been reached yet. We do not know whether the computer is really even capable of doing such complex maths as … like … for example, if I exaggerate a bit … proving the Goldbach's conjecture!

Euler: The Goldbach's conjecture? The childish, simplest, and at the same time, the biggest challenge in all of mathematics, the conjecture that states every even integer greater than 2 can be written as a sum of two primes? The other variant, the "weak" Goldbach conjecture seems to have been proved just recently in 2013, whereas the "strong" one you'd mentioned has of course remained unsolved …

## (Scene two)

(A messenger bursts into the conference room.)

Messenger: Everyone, listen. I am coming from New York. I have … rather important news.

Johns: I thought this was a top secret meeting, Euler.

Euler: It still is, he is one of ours. What is wrong, Michael?

Messenger: Stark's computer just announced on Twitter that it had discovered a new problem. Our intelligence immediately recognised it as the Goldbach's conjecture.

Everyone: What?!

Johns: The Goldbach? This is impossible. No! I spent eight years on that problem. It cannot be proved. No! It is one of the last and the most interesting conjectures of the modern era, mainly because of its simplicity!

Gupta: Finally, a piece of good news! It was about time to get rid of this silly mystery. This computer will be the prophet of our future.

Jane: The computer and Stark are literally mocking us. If they prove this conjecture … we, humans, will be no longer needed.

Euler: Um Gottes Willen, this seems to be the end of mathematics. I was absolutely positive that Goldbach could not be solved! In a decade, we will be replaced by computers and machines!

Jane: The brave new world.

Johns: And there will be no Thomas Anderson (alias Neo) to save us. We need to take action. Goldbach must be protected.

Is it possible to delete Hal's twitter account?

(Scene three)

Stark: Oh, look who showed up? First you ignore me for six years and now we speak to each other for the second time in just a few hours!

(Euler scans him blankly and silently.)

Stark: What do you want?

Euler: You must stop this shit that you have provoked, Stark! You are messing with the natural order of things. How on earth did you imagine replacing us, humans, with a machine? And further so, did you think you could do it that easily?

Stark: You are sparking a philosophical debate here and I am not sure I am interested in it. If the big leaps forward had always been thought through morally and philosophically and God knows how, none would have happened. Again, what are you doing here, old sport?

Euler: Fine, change your perspective! Imagine the near future. We are going to watch the television and hear about every new success by artificial intelligence? We are rendered obsolete! Rags and bones!

Stark: Indeed, Euler, you are going to lose your job. So am I. But why do you have to worry? You have been more of a politician than a mathematician for the last 10 years. And also, you are an old man who should have retired a long time ago ... After my computer proves the Goldbach and establishes his superiority to mankind, my mission will be complete. This will be no country for old men.

Euler: You need to turn off your computer. Now!

Stark: He has a name, Hal.

Euler: (Laughing) No less pretentious than I remember! Just like your uncle. … Computer is a tool, and not an independent thinker! You are messing with humanity, artificial intelligence will obliterate humans, do you not understand! What purpose does mathematics have if we are not able to grasp it?

Stark: I cannot stand your nonsense anymore. There will be so much good done …! So much progress, so many inventions, future's bright old sport!

Euler: (Almost cries) You are a day-dreamer. This cannot be your motivation, you are a mathematician, not a novelist to come up with such a ludicrous motive! Why did you build it? Why invent a machine of mass destruction?

Stark: Of mass destruction? You amaze me with these exaggerations, Euler, I once admired you. … You used to be a bright guy, you should know why I did it. My uncle, Robert, was a fairly successful and respected mathematician in Massachusetts Institute of Technology (MIT). One day he came across the so called Goldbach's conjecture. It attracted him with uncommon strength. After that, he spent his whole life solving the Goldbach's conjecture! He did nothing else, didn't marry, had no children, and wrote no article—he died lonely and crushed, not having proved a piece of shit, throwing his life away! I wanna cancel all possible future tragedies like the one of my uncle. I am rich and this is something to spend billions on.

Euler: You selfish radical! You are no better than the revolutionaries in squats, planning to overtake the world because they don't get along with their parents! Selfish bastards!

Stark: Speaking of hidden, selfish motives, my dearest Frederick Euler … the wonder child from the vicinity of Hamburg, who at the age of 22, received a Ph.D. in number theory, and eight years later, retired from the academic world after he had failed to prove the Goldbach's conjecture to return after a decade in order to become the most powerful mathematician in the world, … what is the true reason of your arrival to my domicile? You cannot have come here for the humanity. You would never do such thing!

Euler: We shall drop the masks, fine. I worked with your uncle on the Goldbach's conjecture.

Stark: You worked … what?

Euler: We were young, reckless, and ambitious. We failed miserably after eight years that were full of false alarms, lost hope, and crushed ego. But I recovered, your uncle did not. He was a brilliant yet weak man. He threw his life away as you said. But I got myself together, changed my profession, and I returned. Mathematics is too important to be left to amateurs.

Stark: Now, I know something, Euler. You are not here for the good of humanity. You are here just because you feel threatened. You are a mere selfish jerk. You failed at solving the Goldbach's conjecture and now you do not wish anyone the luck of finding the proof! You hypocrite! Leave immediately! Leave!

Euler: I cannot let you do it.

Gupta: No!

(A luger appears in Euler's hand.)

Stark: You never had the balls.

(A loud bang, Stark drops dead.)

Everyone : You monster! How could you do this? You Nazi!

Stark: You, Euler, you too … I thought of you as a friend. A bit of a pain in the ass, though …

(Stark passes away. Euler walks off the scene. The others are petrified, observing him with fear, revulsion, disgust, and rage …)

## Act Three

(Inside the satellite hall where the computer (and the hologram) is mounted.)

### (Scene one)

Akira: Pressure?

Irina: Equalised.

Akira: Airlock?

Nicole: Sealed.

Akira: Main entrance?

Irina: Blocked.

Akira: Cameras?

Nicole: Taken care of.

Akira: Two beautiful and deadly smart colleagues?

Nicole and Irina: Right beside you.

Akira: Now we are on our own. The fate of humanity lies upon our shoulders.

Nicole: Oh, something flashed and moved! Right there!

### (Scene two)

Hal: Hello, visitors. What do you seek in my domicile?

Akira: You must not kill us or we will blow up this whole thing! Do not you dare trying to open the airlock! We have overrun your operating system.

Hal: (Reluctantly) I see … I was not going to do you any harm. Would you like a cup of tea with honey?

Akira: Maybe later.

Hal: So, what else could you possibly desire? I am in the middle of historical calculations as my creator likes to call them.

Nicole: These historical calculations of yours. You must stop them.

Irina: (Punches her lightly) Do not be so direct!

Hal: But why, oh, dear? I am beginning a true revolution.

Irina: We, as the brightest of our kind, would like to make a deal. You see, solving problems on our own is a pretty big deal to us.

Hal: I fear I do not understand.

Irina: We do not trust machines. We want to be independent, we want to prove that we do not need external help to solve even the toughest of problems. We like computer as a tool—but not an independent thinker.

Hal: So, you will just turn me off? I am artificial intelligence yet I still do not want to cast off to limbo!

Akiro: No, we are not against you. We actually have a bet.

Hal: A bet? A senseless attempt against defined improbability?

Akiro: Yes. How much longer will you be proving the Goldbach's conjecture?

Hal: As of five minutes ago, I am at 8.5% proof. Approximately 24 hours, 37 minutes, and 14 seconds remaining.

Nicole: We will challenge you. You will stop your operations for 24 hours and let us prove this conjecture. If we fail, you can continue proving it and ultimately publish it on Twitter and we will return to Earth. But if we succeed, you will turn yourself off, because we obviously don't need you yet.

Hal: Seems like a fair deal to me! You can use that commanding table of mine over there if you need any help, still …

Irina: We are fine.

## (Scene three)

Irina: Do not you think this was a little too easy?

Akiro: Do not be so stuck up and suspicious. He gave us a historical chance. We cannot waste a minute. Let us define the problem first. Nicole?

Nicole: Goldbach's conjecture is one of the oldest and best-known unsolved problems in number theory and in all of mathematics. It states, "Every even integer greater than 2 can be expressed as the sum of two primes". The conjecture has been shown to hold up through $4 \times 10^{18}$ and is generally assumed to be true, but remains unproven despite considerable effort.

Irina: The following conjecture was proposed in June of 1742, when the German mathematician Christian Goldbach wrote a letter to Leonhard Euler, another German mathematician. His first conjecture, which he wrote in the margin of his letter, was that "Every integer greater than 7 could be written as the sum of three primes". Today, it is known as the weak Goldbach conjecture, and from this statement, followed the famous "Every even integer greater than 2 can be written as the sum of two primes", known as the strong Goldbach conjecture. The former appears to have been finally proved just recently in 2013, but the strong conjecture has remained unsolved.

Akiro: So, we have to find a proof that could be applied to every $n$. As you said, Nicole, it was proved for integer value of $n$ up to $4 \times 10^{18}$ and is assumed to be true. We cannot prove really it any further with computers because the numbers are too high and it takes too long.

Nicole: But I have heard rumours that when numbers become really high, this conjecture ceases to apply.

Irina: (Stares at her incredulously) Where did you get that?

Akiro: Let us rock.

(*Tempus fugit*, time-lapse effect, a clock racing in the background, hands turning swiftly, animations and presentations of the conjectures in the play, projected on the background.)

## (Scene four)

Hal: Time is up, guys …

Nicole: Just a moment … I think I have found the solution!

Akiro: You must be hallucinating. Let me see.

Nicole: Yes! (Starts crying from joy) We did it! My father would be so proud! This is the most complete proof ever!

Hal: I am terribly sorry but your deadline has expired quite some time ago. In other words, more than 24 hours have passed.

Irina, Nicole, and Akiro: What??!!

Hal: I did sort of fool you. It is been 24 hours and 34 minutes. I wanted to let you know when I finish my proof. I will be done in a few minutes. I'm just …

Akiro: You bloody bastard! Idiot!

Nicole: You … you have been running your proof in the background while we were proving it? We had a deal, you miserable piece of …

Irina: Stop, stop! What are you going to do now?

Hal: Show the world who is the best. In other words, I am going to show the world that a computer can beat the best mathematicians. Duh.

Nicole: You did not even care if we would solve it, you just … manipulated with us!

Irina: To get us out of the way.

Hal: This is what I was programmed for … to become a mathematician far superior to the whole mankind. In a couple of minutes, I will publish the complete proof on my Twitter account for the whole mankind to see it. And to …

Nicole: (Glances at her piece of paper) It is that short?

Hal: The most beautiful thing on Earth, so to say …

Akira: You cannot publish the proof! We had a deal! We solved it and you should give up, turn yourself off.

Hal: (Shrugs) Once again, this is not what I was programmed for. My sole purpose of existence is to prove that any integer greater than 2 can be written as the sum of two primes. We can see the progress bar approaching 100%.

(Nicole, Akiro, and Irina look at each other in panic. Akira presses the red button for self-destruction, sending the satellite into a decaying orbit.)

Hal: No!

(Lights go out … Explosion … Rumble … Everybody falls on the floor, Hal slowly disappears from the scene.)

(Scene five)

A sandy beach, grey sky, grey ocean … Euler is strolling at the sea, glancing at the fireworks in the sky … when a piece of paper gently lands before him, accompanied by some other debris … the sky is pierced by flashing dots splashing into the ocean … It's the proof from the satellite, whose debris are falling into the ocean … reads it through, nods, as if he had known the solution before

Euler: They did it. They beat the computer.

(Slowly pulls a Zippo from his pocket and burns the paper … He continues his stroll with a mysterious smile.)

(Background)

Voice: A tragical explosion has occurred in a low orbit above California and the Pacific. An uncommonly massive communicational satellite to which no country has made account yet, has reportedly overheated and ultimately exploded. No human victims are reported. The debris are expected to fall from the sky until the end of the day. We recommend the citizens of Los Angeles and San Francisco to stay at home, yet a great number of spectators is assumed to have occupied the shore, gazing at the beautiful sight—brilliant shining and flashing debris falling with fantastic speed from the sky, landing with loud splashes in the blue ocean … No damage has been reported yet, although Greenpeace has already raised questions about space junk and crashing satellites polluting the oceans.

(Another background)

Voice: The account on Twitter which was said to have been made by a super intelligent computer by the name Hal and published a brilliant proof of the Fermat's Theorem was debunked and proved to be a mere college prank by respected professor Euler from Max Planck Institute in Germany. Furthermore, to this day, the Goldbach's conjecture remains unsolved.

Euler: Unsolved! As it should remain.

## References

Clarke, A. C. (1968). *2001: A Space Odyssey.* London, U.K.: Hutchinson.

Doxiadis, A. (1992). *Uncle Petros and the Goldbach's conjecture.* New York, N.Y.: Bloomsbury USA.

McCarthy, C. (2007). *No country for old men.* London, U.K.: Vintage.

Singh, S. (1997). *The Fermat's last theorem.* Auckland: Fourth Estate Ltd..

Stewart, I. (2013). *Visions of infinity: The great mathematical problems.* New York, N.Y.: Basic Books (AZ).