

Inequalities

The sky was grey and shady. Sluggishly, number 101010 got up from bed and started walking to the kitchen. He glimpsed through the window and the coldness coming from the outside made him shiver. The sadness and melancholy that were reflected on the window further intensified the emptiness that he felt inside him. His everyday life was an unrelenting suffering: all other numbers were continuously mocking and insulting him. He lived in a fully hierarchical system: those who had high digits were well-regarded and respected, whereas those who only had zeroes and ones, such as himself, were discriminated and abandoned. Day after day, 101010 grew increasingly tormented and distressed. While he was sitting alone aimlessly eating his breakfast, the words he was told the day before kept ringing in his head: “you are a useless number”, “you only have low digits”, “you are irrelevant”. He could not strip these thoughts away, and he was starting to believe that the other numbers were right about him. He sighed while a timid tear rolled down his cheek. While still disheartened, he realized that he would be late to work at the factory of periods for decimal numbers.

Number 101010 was waiting at the bus stop when he suddenly noticed that another number was approaching him. What he could not have possibly thought was that this number would be the beautiful 42 – he daydreamed about her all the time. She was gorgeous, with two consecutive powers of two. Number 101010 could not stop staring at her. But even digit 4 was too high for him, and number 42 hated him like all others did. He nervously offered her his bus seat. While in this case he was trying to be courteous, there was an official law which required low digit numbers to give up their seats in public transportation to those with higher digits. Number 101010 was still failing to find the right words to say to her, and he finally managed to stutter nervously:

- I... I hope that you have a... a g-g-good day...

Number 42 regarded him with contempt and responded:

- I am sorry, but I do not interact with those from your numeral class – and she quickly turned away.

Number 101010 lowered his face so that others could not see him weeping. He was fed up of living in that cruel world that despised him. He got off the bus because he could not stand seeing the 42 close to him any longer. Once he was out of the bus, he started running and running, as if all of his grieve could dissipate with the speed. He felt incapable of living any longer. He ran even faster, covering his face with his hands as the tears kept rolling down. Why had he been born that way? Why could he not be like the other numbers? The feeling of impotence was killing him inside.

Suddenly, he hit someone and fell onto the floor, screaming with pain. When he managed to lift his eyes, he realized that he had bumped into and hurt the very honorable number 999. She was lying on the floor, unconscious. Due to 101010's high speed he had hit her really hard – so hard that she had broken one of her legs, and now her last 9 digit looked like a 0.

101010 shrieked in fear. This was the worst disgrace that a number could ever face! To lose the best digit of them all! The 9! And on top of that, it had been the fault of a foolish number who only had zeroes and ones. Very soon, the ambulance and the police arrived to the scene, and 101010 found himself surrounded by an angry crowd. All the numbers that were passing by stopped and looked at him in disbelief. What a shame! The doctor inspected 999's wound and declared:

- She will recover her last digit, but it will take quite a long time.

A heated whisper started to spread around the crowd, and the numbers started to demand a serious punishment for 101010.

- He insulted our race! – shouted a 898.

- Once again his numeral class showed us what these monsters are capable of – angrily proclaimed a 76.

- And to think that he turned a 9 into a 0! A 0! The worst possible digit! – continued a 59.

- Jail! Jail! Jail! – shouted the crowd.

101010 was panicking, and he implored clemency to the mass.

- Please forgive me! It was an accident! Please! – he shouted one time after another, to no avail.

His words were futile, and he was soon closed up in a prison cell. He had been sentenced to 9 years in prison, and he was absolutely devastated. He started bawling, unable to believe the 180 degree turn that his life had just taken. Suddenly, he heard a mysterious whisper next to him: "Hey you! Yes, you! Look to your left". He turned around and to his neighboring cell he found a 110, who was smiling at him.

- I can finally talk to another number! – he roared with happiness –. I had been alone here for a while.

- Why are you here? – dared to ask 101010.

- It is a long story... but put short, I refused to give up my bus seat to a 989.

- That is very brave of you! – responded him with admiration. I am here because I broke a 999's leg and turned her last digit into a 0.

110 frowned.

- They will make you pay for this. Our world should not be so unfair. Things must change! Tell me, why is it that those numbers with higher digits have more rights? It does not make any sense!

- Let it go, we cannot do anything about this. That is how the world works.

- Surely we can do something about this! We must fight for our dignity as numbers. Have you never heard of the Babylonian Empire? They used 60 as a base, not 10. And they also lived in the midst of tyranny and injustice. But those who supported the decimal system managed to unite and fight back, and look at where that got us now. Sadly, us numbers do not learn from our past mistakes and fall again into the trap of oppression.

101010 stared at him, puzzled. So, things had actually been different in the past? In that case, then maybe it was possible for them to do something about their situation.

- But in any case, we are now trapped inside here. We cannot get out – he responded.

110 widened his smile.

- I have to confess you another secret. But you have to promise me that you will tell absolutely no one about this!

101010 looked at him in disbelief.

- I promise you! It will be a secret between you and me.

- Alright then. Before coming to prison, I had been investigating a secret old book that I found in a hidden library. It was hidden between some chests that came from a very far land. They were about dark magic!

- Dark magic? – answered 101010 –. Surely you must be joking!

- Of course not. It is a very powerful art. Listen to me again: do you want to get out, yes or no?

- Yes! It is all I want – 101010 replied quickly.

- Then I will tell you how to do that. Our government has tried very hard to keep this secret hidden, but they did not manage to hide it from me!

110 took a little box from his pocket with care. He opened it softly and took out a small golden 2 figure. 101010 was very confused:

- How is this golden 2 supposed to help me?

- Today, when the midnight bell strikes, rub yourself with this figure while you recite the words that I will teach you. In this way, you will be able to change your base!

- Change my base?! Is it really possible? I thought this was a myth! – answered 101010 excitedly. He had always dreamt about changing his base and abandon his ugly ones and zeroes.

- While you rub yourself with the 2 you will convert from binary to decimal base. You will keep multiplying by the powers of the golden figure. You have a few hours to properly learn the words that you will need to be reciting – 110 warned him.

And that is how they spent their afternoon. 101010 was ready to begin a new life. When the sun set, 110 asked again:

- Are you sure that you will be able to do this?

- Of course! – he answered quickly.

- But you have to promise me that when you get out of here you will use your base change to build a better future for all of us. Promise me.

- I will.

- After converting bases, tell the guard that there has been a mistake and that they should release you immediately. They will have no reason to keep you here. Remember, however, that there is one little inconvenient. The spell will only last until the sun rises. And after that you will not be able to convert to decimal ever again. This is why I cannot use the magic myself.

- Only until then?! And I cannot do anything about that?

- No. Take full advantage of the few hours that you will have.

The midnight bells rang and 101010 started to recite the magic words. The first $0 \cdot 2^0$ came out and after that a $1 \cdot 2^1$ followed. The powers kept adding up until they became $2 + 8 + 32 = 42$. He was number 42! Full of joy, 42 looked at his new appearance. He could not believe that he did not have any zeroes nor ones in his body anymore. Following 110's instructions, he called a guard and told him that there had been a mistake when locking him up. The guard revised the detention papers, and very confused, admitted that the number 42 had not committed any crime. He apologized for the confusion and guided him to the door. Before leaving, though, 42 turned around and whispered to his new friend 110:

- Thank you.

He spent all night wandering around the city. He could not believe that no one was insulting him, or kicking him, or avoiding him. He could just walk in peace and dance with the city lights! He took the bus and went around to all the shops whose entrance had always been forbidden to him. He also entered the rich part of the city, which was banned to numbers with low digits. In that area, nightlife was so lively and energetic. After a while, he got tired of walking and decided to get into a bar. While he calmly sipped his drink from a Klein bottle, the bar door opened and his beloved 42 entered with some of her friends. He could not believe his eyes, and he thought that she looked especially beautiful that night. For the first time in his life, he was able to walk up to her and exchange some words.

- So it looks like we share the same digits. Can I invite you to a drink? – he asked with a smile.

She laughed (laughed at his words!) and answered:

- You are very gentle. I think that I will accept your invite – she answered graciously.

They sat down together and talked for a very long time. Number 42 (well, actually, 101010) had never felt happier, and he could not believe everything that was happening to him that night. While she was excitedly telling him about how all her family members only had digits that were powers of 2, he suddenly went pale. He had just seen a slim ray of sun finding its way through the bar's door opening. No! That could not be! It was too soon!

- What is wrong? – she asked, surprised.

- N-nothing... Nothing i-i-important... – he answered in a soft voice.

But he immediately felt pain all over his body and got divided by 2. He then became number 21 and the remainder of the division, which was a 0, appeared. He kept dividing himself successively until all of the residues and the last quotient aligned and formed again the number 101010. His 42 appearance was gone forever. Meanwhile, she had been staring at him in bewilderment. She could not believe what had just happened in front of her eyes.

- What did you do? How did this happen? Are you a simple 101010?

He aligned well his digits and cleared his throat. All the numbers in the bar were looking at him in silence. Had they really witnessed a change of base? That was impossible, they all thought. But 101010 walked to the front of the bar. He no longer feared those numbers. He no longer believed that they were superior to him. That was all over.

- Yes, my friends, I am a simple 101010. I have spent all my life surrounded by discrimination and hatred, solely due to the fact that my body has zeroes and ones. Could any of you explain to me why exactly does a digit 9 have more rights than a digit 0? Why do you consider that some numbers are superior to others? Why do we segregate ourselves? There is absolutely no reason to support these absurd statements, and we should not tolerate a single act of discrimination among us. We are all numbers, after all. We can admit addition and multiplication regardless of who we are. Mathematics would develop much quicker if we allowed everyone to collaborate in this enterprise, instead of leaving them aside. How are we capable of manipulating such a beautiful discipline – Mathematics – with unjust laws only so that some of you can feel superior to others? I sincerely hope that the change of base you just witnessed will guide you towards the realization that our social differences are meaningless, and that a brighter future lies ahead of us if we unite.

Then he looked at her beloved 42 and added:

- And I also hope that, in the near future, numbers like me will be allowed to love freely. Without fear. Without discrimination. Without hate.

She smiled. In that very moment, they could have never imagined that in a few years the field of Computer Science would emerge, and that digits 0 and 1 would become of the greatest importance.

But that is a different story.