Vi Hart Transcript - Video #2, Infinity Elephants

Transcript:

Let's say you're me and you're in math class. You're supposed to be learning about exponential functions, but you're having trouble caring about exponential functions because unfortunately your math class is probably not terribly engaging.

You're supposed to be drawing and labeling some axes so that you can graph this y=2^x thing, and your teacher seems to think that drawing and labeling axes is the very essence of mathematics, but you're bored and can't help but wonder: y.

So you do what any conscientious student would do in this situation, and start doodling. And, because you're me, you like to play games with yourself when you doodle.

Here's one game: you.re drawing a line, but when it crosses one of the blue lines on your ruled piece of paper, it splits into two lines. Maybe this line is like the neck of the mythical Hydra, where every time one of its heads gets chopped off by a blue line, it grows two more in its place.

You want to see if you can get all the way to the bottom of the page following this rule because if you do, then you can draw all of the little hydra heads at the end, but you don't get very far on your first try.

You decide to try again, this time spacing things out a little more at the beginning. Unfortunately things are filling up fast, though you got farther than last time. Maybe if you have more room, or maybe if you sharpen your pencil more, you can get to the bottom of the page.

Oh, and don't forget to draw and label your axes. If each broad swing of Hercules. sword chops off all the heads, thus doubling their number, well, you can see where I'm going. I'm not going to try to teach you math, just how to wield it for doodling purposes. In this case, that's gonna be a lot of heads. Good luck Hercules.

But maybe drawing binary trees all straight like that is not an interesting enough game to hold your attention for long, so you start drawing them in arbitrary shapes. Or less arbitrary shapes.

Maybe you start drawing a binary tree that looks like a tree, and maybe you can.t see this tree in very high quality because your camera, much like your math class, is fuzzy, unfocused, and altogether not very good. Maybe you change the rules slightly, and make a ternary bush, where each branch sprouts three more branches.

Unfortunately your math class is 45 minutes long and soon you need a more interesting doodling game.

Say you go back to the game where your line splits at every level. Only this time, instead of trying to squish all the lines in, you let them hit each other. And when they crash, there's a fiery explosion, and the crashing lines end there.

Maybe you turn your notebook sideways so that you can make sure you're getting the horizontal spacing right. Maybe, to go back to mythology, Hercules has a method where instead of cauterizing the necks of the hydra to keep them from growing back, he's found that the necks stick together if they get too close, and instead of growing new heads they just fill up with blood. It might sound a little morbid for math class, but maybe if the curriculum wasn't so appalling and the teaching methods weren't so atrocious, you wouldn't have to entertain yourself with these stories and games.

Speaking of this doodle game, something very interesting is happening. Looks like your simple rules about splitting and crashing are creating Sierpinski's Triangle, which is a pretty awesome fractal. But the point is not to learn about fractals or cellular automata or Sierpinski, but to show that simple doodle games can lead to mathematical results so cool and beautiful that they're famous. At least, famous to people like me. And if you're good at inventing doodle games, you might even end up doing some real mathematics during your math class.

Anyway. Maybe you don't care about accuracy. Maybe you try the game again, only you don't keep track of spacing, and when you make a mistake and accidentally grow heads where you shouldn't, you just roll with it. Now you've introduced an element of random error, and you want to know how this will affect the final picture. It still looks like a pretty awesome doodle and has many of the same elements, though it lacks the structure.

Speaking of structure, maybe, because you're really super bored and your class is seemingly never going to end, you start looking at the number of necks at each level and trying to figure out the pattern.

Maybe you haven't forgotten about powers of two.

Anyway I hope I've provided you with something entertaining to do next time you're bored. Good luck with your math class.