

Functions and Feelings - How Math Models Human Relationships

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Introduction

If mathematics had a favorite way of expressing or “talking” about people, I honestly think it would choose functions (or at least that’s what I think). A function sounds “cold” and pretty straightforward at first: a rule that takes an input “ x ” from a domain and assigns it exactly one output $f(x)$ in a codomain. Very strict. Very “don’t improvise!” But the more I reflect on it, the more it feels human... quite odd considering that maths is so abstract yet it can feel so familiar. Relationships are full of patterns, responses, conditions, distance, repetition, and most importantly, change. Functions do not just model numbers. They model the fact that one thing affects another and that’s basically the entire plot of being alive, being human!

Formally, we write:

$$f: A \rightarrow B, x \Rightarrow f(x)$$

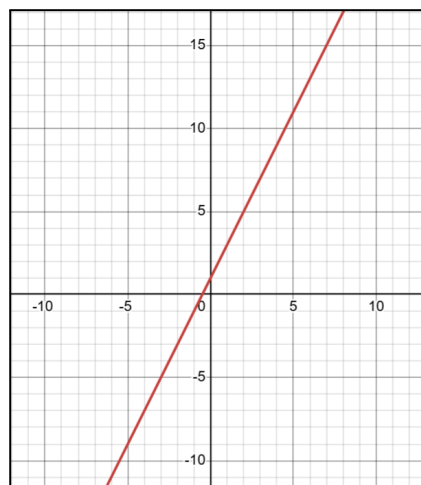
Which means every x in set A is matched with one value in set B. The keyword is **one**. That is what makes a function different from chaos. If I text my friend, “are you mad at me,” there may be many possible emotional universes behind her answer, but the message I receive is still one output.

Human relationships are not as neat as algebra, obviously, yet functions give us a way to visualize connections without pretending life is random confetti.

Linear and Quadratic functions: Stability against change

Firstly, I'd like to start off with a simple example - linear. Suppose a friendship's trust level depends on repeated acts of honesty, let

$$T(h) = 2h + 1$$



Where h is the number of honest actions and T the trust points.

If $h = 3$ then

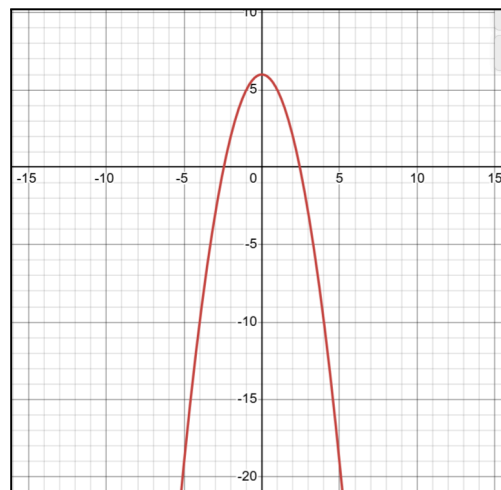
$$T(3) = 2(3) + 1 = 7$$

This is not because trust is literally a vending machine where you insert three truths and get seven friendship coins back. It's because a linear function manages to capture a basic emotional intuition: Steady effort creates steady change. The graph is a line, and lines are comforting. They suggest consistency. They say, if I know your pattern, I can predict your direction.

But not every relationship is linear (makes things more fun). Some people do not change steadily. Some interactions are a curve. A parent and a child relationship, for example, might start with intense dependence, then shift towards independence. A quadratic function can show that.

Take

$$R(x) = -x^2 + 6x$$



Where x is time, and R is relational closeness during adolescence. Solving for the vertex gives the moment of greatest closeness. Since the vertex of $ax^2 + bx + c$ at $x = \frac{-b}{2a}$, then

$$x = \frac{-6}{2(-1)} = 3$$

Then

$$R(3) = -3^2 + 6(3) = -9 + 18$$

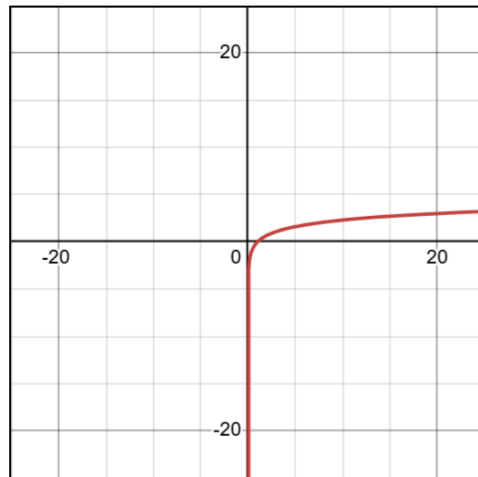
$$= 9$$

So the maximum closeness is 9 at $x = 3$. That shape tells a whole story: closeness rises, peaks and then falls. Not because love disappears, but because identity begins to form.

Domains and Inverse functions: Limits and irreversibility

Additionally, domains also matter, and this is where functions start becoming more philosophical. A function is not defined everywhere. For instance

$$f(x) = \ln(x)$$



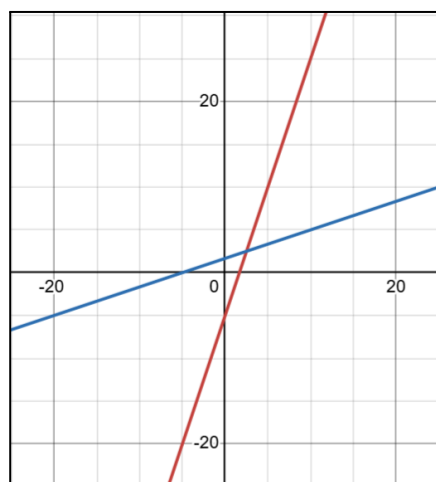
only exists for $x > 0$. You can't just throw in $x = -2$ and demand meaning from it because $\ln(-2)$ is not real in this context. Relationships work like that, too. Some versions of closeness require conditions. Trust does not exist in every environment. Vulnerability is not defined with everyone. There are conversations you can only have after a certain point.

Inverse functions make this more interesting. If

$$f(x) = 3x - 5$$

then

$$f^{-1}(x) = \frac{(x+5)}{3}$$



and

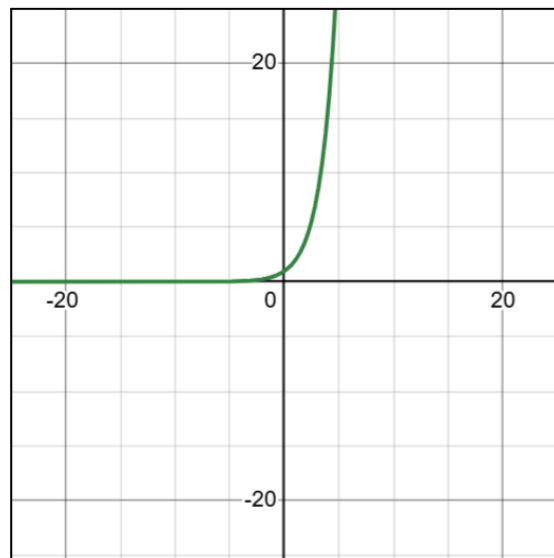
$$f^{-1}(f(x)) = x$$

Mathematically, an inverse undoes the original action perfectly. Humanly, that is almost tragic, because people are not invertible! You can apologize, heal, grow and repair, yet you can't restore the exact initial state.

Exponential and logarithmic Functions: Growth over time

Then there are exponential functions, which are amazing for showing how small things become large. Let resentment be modeled by

$$P(t) = 2^t$$



then

$$P(1) = 2, P(2) = 4, P(3) = 8, P(4) = 16$$

As we can see, the output values increase, which is exactly the point. One ignored issue may stay small. Four ignored issues suddenly become overwhelming.

Logarithmic functions do the opposite. Consider

$$L(x) = \ln(x)$$

At first, growth is fast, then it slows. For example

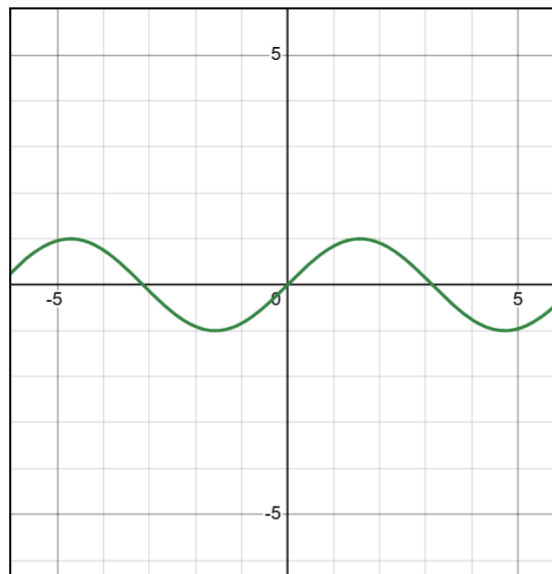
$$L(1) = 0, L(e) = 1, L(e^2) = 2$$

To increase the output equally, the input must grow much more. That feels like deep relationships: Intense at the beginning, then stable and subtle over time.

Trigonometric functions: Cycles and emotions

Moreover, trigonometric functions, in my opinion, are the most “human” out of all the functions because they are periodic. Take

$$y = \sin(x)$$



It oscillates forever between 1 and -1. This model's emotional cycles in everyday life: highs and lows, conflict and resolution. The period is 2π , meaning the pattern repeats, but never at the same moment. Relationships are like that. We constantly revisit feelings, but we are never the same person again.

Calculus and tangents: Change and Fleeting connections

Calculus has recently become my favorite maths topic, it has really allowed me to view maths through a more philosophical lens. Through calculus, we can continue to push the metaphor further. A derivative measures instantaneous change if

$$f(x) = x^2 + 1$$

then

$$f'(x) = 2x$$

At $t = 4$

$$f'(4) = 8$$

So the relationship is changing quickly at that moment. It's not just growth; it is how fast growth is happening now.

Then there is the tangent line. Take

$$y = x^2$$

The derivative is $2x$, so at $x = 1$, slope $x = 2$. The tangent line is

$$y = 2x - 1$$

A tangent touches the curve at one point and then leaves. That is like those brief but intense connections with people who understand you perfectly for a moment, then disappear.

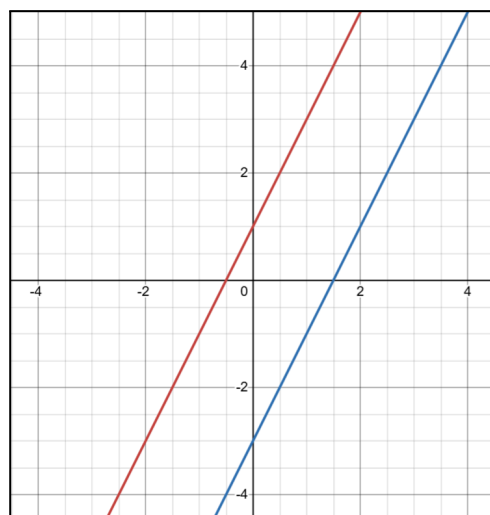
This idea is explored deeply in *A tangent about Tangents*, where the tangent is described as a line that “touches the curve at one point but does not intersect further,” which honestly sounds exactly like certain people in life.

Parallel lines: Missed connections

Parallel lines are one of the most brutal but accurate metaphors in mathematics. Two lines with the same slope, like

$$y = 2x + 1$$

$$y = 2x - 3$$



They follow the exact same direction and pattern. The only difference is their y-intercept, their starting position. Because of that small difference, they will never meet, no matter how far they extend.

Now if we try and find its intersection

$$2x + 1 = 2x - 3$$

$$\Rightarrow 1 = -3$$

which is impossible. There is no solution, meaning no intersection exists. In human terms, this suggests that two people can be extremely similar, with the same values, same direction, but never cross paths because of differences in timing or starting point.

Parallel lines are also separated by a constant distance, meaning they are always equally close yet never connected. This reflects relationships where people understand each other deeply but remain apart.

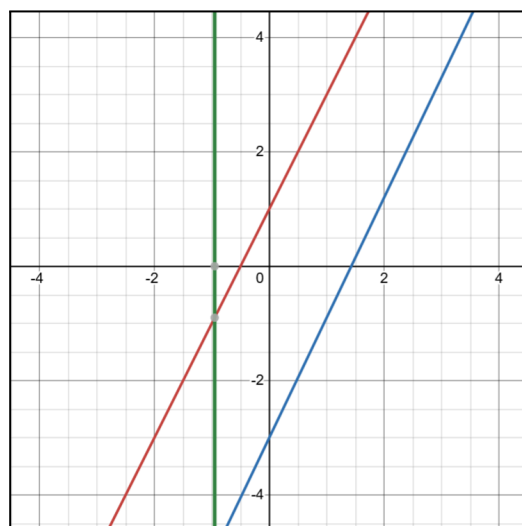
However, if the slope changes even slightly, everything shifts. For example:

$$y = 2x + 1$$

$$y = 2.1x - 3$$

Solving:

$$2x + 1 = 2.1x - 3 \Rightarrow x = 40$$



They do intersect (but far away). This shows how small differences in direction can eventually lead to connection, but often only under very specific conditions.

Conclusion

So yes, functions shape and visualize human relationships because they reveal structure without removing emotion. They show effort, limits, cycles, distance, and change. They remind us that not everything is reversible, not everything is defined everywhere, and not every connection lasts forever.

Mathematics does not replace feelings; it explains their patterns. A function is simple: every input has an output. But in that simplicity lies something powerful. We affect each other. We change each other. And somewhere between x and $f(x)$, a whole human story unfolds.

Maybe that is why maths feels comforting sometimes. It does not tell us who to love, but it helps us understand why some people are constants, some are asymptotes, and some change our “graph” forever.

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