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Euler's Identity: The Pinnacle of Human Existentialism

In mathematics, Euler's identity is the equation where e is Euler's number, the base of natural logarithms, i is the imaginary unit, which by definition satisfies $i^2 = -1$, and π is pi, the ratio of the circumference of a circle to its diameter. This results in $e^{i\pi} + 1$. At first glance, someone in elementary or middle school would assume that this formula was merely the result of sloppy typing or a cat walking across a keyboard. Perhaps older individuals would assume the same thing. But this formula is the first half of what can be referred to as the pinnacle of basic math, and the foundation of advanced math. High schoolers in Calculus and Algebra would be familiar with all the symbols presented. Each letter and symbol has a meaning that students are tasked with interpreting. With these symbols, we are now open to a world of advanced math and reasoning.

There's one issue, however. The solution to the equation is nothing. After expanding the equation and solving it regularly, we find that the result is 0. All that work and all that writing just to have nothing. A big old goose egg. This aforementioned landing point of basic math and jumping point towards advanced math is worthless. We expect some expanded formula or some final, resolute answer, and instead we get something so rarely seen in math.

So why solve the equation? If we know that the ending will be nothing, why waste the time to solve it? Furthermore, why *create* the equation? Euler developed this equation to present how beautifully connected all 5 core aspects of math are. What he instead presented is the overall dilemma for our human condition. Euler has created a formula that students now learn as an example of the versatility of their core curriculum. It serves as nothing more than proof that the work *matters*. There's no real world application for this equation; an architect won't use it to design a building; an accountant won't use it to calculate expenses and earnings. There's no point.

Furthermore, the result is just as disappointing. *Zero*. Perhaps *one* would be a better result; proof that math works in a circle, that everything we do will bring us back to the beginning. The result of zero does not give us this. Zero is rarely considered to be the beginning of any order or count. It is neither odd nor even. *Zero is nothing*. Euler's identity therefore brings us to neither the beginning nor the end, but to a limbo. Purgatory.

This is our human condition. We create ideas and issues to solve to prove that there is a higher meaning in the world. If there is a problem to solve, we have a purpose. If we have a purpose, perhaps Someone or Something put us there for that purpose. And if there is a Someone or a Something, then there must be a *Somewhere*. If there is a higher power that guides us and gives our lives meaning, then there has to be an endgame. We have to have a reason for living our lives.

But then look back at Euler's cause for developing his identity: nothing. There was no practical reason. He developed his identity because he *could*. He developed and taught it to validate his work and his teachings. No issues are solved nor created with this equation. In terms of mathematical principles, Euler's identity is essentially inconsequential. It brings in no new ideas or concepts, instead justifying ones we already know.

What if our lives have all become Euler's identity? We were born too late to explore the world, but too late to travel through galaxies. We were born just in time to learn an equation that quite literally amounts to nothing, however. Are our actions just parts of a broader Euler's identity? Do we live our lives for no real reason, instead developing our own ideas and morals to follow as tribute to an unknown power? We expect this hypothetical God to be kind and fair, to give us a purpose and a soul and a final destination based on how we lived our lives. This idea has to be pure myth because of how uncharacteristically human it would make God. Despite our crimes and atrocities, we are adorably ignorant creatures. We reward our dogs for retrieving sticks that we threw for the purpose of retrieving. We create a problem, expect a solution, and reward those who find the solution. That is how humans live our lives. God is not human, so why should we expect God to behave as such? Theologians and philosophers have argued for centuries over the motives behind God, why God chose to step aside and allow slavery, the Holocaust, and numerous other tragedies to occur. But *why* should we expect an answer? Justifying the motives for one's actions is purely human. Perhaps God allows these atrocities to occur because he **could** or he

couldn't. Either he could intervene, but chose not to because God is detached from our humanity. He chooses to ignore us. Or, he cannot intervene. It is not his place nor his power. Both theories are equally terrifying.

We ponder and despair over our role in the universe. But what if we have no role? Would that be horrible? I doubt stallions racing through the fields spend hours contemplating whether their grazing connects to a cosmic purpose. As much as we try to detach ourselves, we are animals bred for animal purposes. We merely evolved a fatal flaw of existentialism. Perhaps it is better if we have no role; at that point, are we not free to live our lives however we want? Are we not free from the expectations of an either detached or powerless God? With no role, we have no fear. We have power over the way we live our lives.

Euler's identity was developed to show to students how connected the world of mathematics is. Instead, it shows us how self-destructive humans are. We focus far too much on our purpose and the endgame that may or may not exist rather than enjoying life. This essay is a Euler's identity in itself!

We can either choose to tackle Euler's identity with fear, or with hope. And maybe that is the overall purpose of such an equation. The result is nothing, and it is our choice and our power to do what we desire with that. We have an endless easel of opportunities when the sum of all our work is zero.