Using Mathematics to Solve Paradoxes and Philosophical Problems

An Essay by Jacob Mikhalchuk

Mathematics is a broad and seemingly unending subject. Every year there are new entries, papers, discoveries found and submitted in all fields of mathematics. That being known, it is not surprising that with so many new discoveries, comes a seemingly bigger list of problems. Many seem to be unsolvable and without the slightest hint of an answer. Many of these problems are paradoxes, logical contradictions that come from our own rules. In the past, when a problem could not be solved, we would see the abandonment of a field, or the abandonment of a way of thinking. I propose that maybe we gave up and still give up today too easily. That there are other ways to tackle these logical paradoxes and contradictions.
That method being: using arithmetic and abstract ideas to bring us to some kind of an answer.

Theseus's ship is a well-known logical puzzle. Simply asking the reader if a ship that has had all of its parts replaced is still the same ship, or a new one. To go further with that question, when does something even become new? Is there even a way to find an answer that is not just someone's opinion? Yes, well I think so at least, and I reached this conclusion using some, albeit basic mathematics, but solid mathematics.
It is also important to note that the main point is not to use the most complicated mathematics, although for much more complicated paradoxes and puzzles, we will need more complex methods, for this particular demonstration, it will not be needed.

First I tried to find something in mathematics that could represent this problem. I chose a whole number X, in this case 1, to represent a completed ship. If we break the ship into parts, it would be like breaking up a whole number into fractions. One plank could represent a fraction x, (say .05.) We know that 1 is equal to 1 and is not equal to any number that is less than or greater than 1. So using our whole number analogy, we can conclude that a whole ship is only whole when all of its parts are together making up the ship. Just like a whole number can be the sum of its fractions, the ship can be made up of its parts. Now to get to the underlying question, is the ship new when all of its parts are? Or is the ship new when only one part is? If we take out the mast of a ship, we would say that the ship is incomplete. We can say that the mast represents 20% of the ship. That leads us to a realization: only having 20% is not having the whole ship, it is having a fraction, or percentage. So now we add on 40% more making it not whole, but now 60%. We can do this until we reach 100%. Now we have a whole ship. To answer the question, we simply need to make the distinction that 40%, 50%, 60% etc. of new parts will not make the ship new. Not until 100% of the parts are new, thus creating a whole new ship.

That was a rather seemingly complicated and unnecessary breakdown of simple fractions and whole numbers, regardless, using those simple mathematics, we have found an answer. Whether another mathematician will refute it and find some deeper truth is not the main point. The point is that a particular field or way of thinking does not have to be thrown out when presented with a complicated and seemingly unsolvable problem. Furthermore, a problem that could be seen as useless, could actually teach us, or bring us to a new result. The result may not be an answer, but could be a realization leading to a revolutionizing idea or innovation in mathematics.

One paradox that I find fascinating is Russell's Paradox. A problem that arose from set theory, and could not be solved led to a change in the field, and a significant one at that. To my main point about solving paradoxes using mathematics, I can see a counterargument. It would be that having unsolvable problems leads us to new and exciting discoveries. For example, Russell's Paradox lead us to establish some new rules and axioms to avoid future mishaps, and we use those same rules today. I understand that point of view, but I strongly believe that maybe we give up too fast sometimes. Maybe we could have found a solution using some kind of new and complex methods. Where the nature of the answer could be abstract, but would nevertheless still be an answer. I also see giving up on a paradoxical problem such as Russell's Paradox as a wasted opportunity. In my humble opinion, I believe that enough brain power and collaboration mixed with being open to new ideas could have led us to a deeper level of mathematics, particularly in set theory.

Something else that I could potentially see as being solved using this method, where we use mathematics to solve philosophical problems, would be the Continuum Hypothesis. A long shot yes, especially because Gödel's Incompleteness Theorem implies that there are unprovable, true statements. Nevertheless, it would still be a shot. Abstracting certain information and creating analogies from different mathematical theorems, maybe even using old methods in new ways, could lead us to new roads, which in turn would lead us to hidden truths. I myself am by no means an expert in these fields, but I do know that the first step to discovering something new is thinking outside the box and outside the standard notation. It does not mean that we will never fail, but rather that we are moving in a new direction. Knowing when to admit defeat is also important for it's necessary to avoid being caught up in your own head, but that is what colleagues and friends are for, helping each other stay sharp, and focused, but still determined to discover.