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SINCE THE LATE 1600S, when calculus was being developed by the greatest mathematical minds of the day, scores of people across the world have asked the same question: When am I ever going to use this?

If you're reading this, you're probably interested in the answer to this question, as I was when I first started learning calculus. There are answers, like "Calculus is used by engineers when designing X," but this is more a statement of fact than an answer to the question. The pages that follow answer this question in a very different way, by instead revealing the hidden mathematics—calculus in particular—that describes our world.

To tell this revelatory tale I'll take you through a typical day in my life. You might be thinking: "A *typical* day? You're a mathematician! How typical can that be?" But as you'll discover, my day is just as normal as anyone else's. In the morning I sometimes feel groggy; I spend what feel like hours in traffic (even though they're only minutes) on my way to work; throughout my day I choose what to eat and where to eat it; and at some point I think about money. We don't pay attention to these everyday events, but in this book I'll peel back the facade of daily life and uncover its mathematical DNA.

Calculus will explain why our blood vessels branch off at certain angles (Chapter 5), and why every object thrown in the air arcs in the shape of a parabola (Chapter 1). Its insights will make us rethink what we know about time and space, demonstrating that we can time travel into the future (Chapter 3), and that our universe is expanding (Chapter 7). We'll also see how calculus can help us awake feeling more rested (Chapter 1), cut down on our car's fuel consumption (Chapter 5), and find the best seat in a movie theater (Chapter 7).

So, if you've ever wondered what calculus can be used for, you should have a hard time figuring out what it *can't* be used for after reading this book. The applications we'll discuss will be accompanied throughout the chapters by various formulas. These equations will gently help you build your mathematical understanding of calculus, but don't worry if you're a bit rusty with your math; you won't need to understand any of them to enjoy the book. But in case you're curious about the math, Appendix A includes a refresher on functions and graphs to get you started, and appendices 1–7 include the calculations mentioned throughout the book, which are indicated by superscripts that look like this.*[1] (You'll also find footnotes indicated by Roman numerals and endnotes indicated by Arabic numerals.) Finally, on the next page you'll find a breakdown of the mathematics discussed in each chapter.

Whether you're new to calculus, you're studying calculus, or it's been a few years since you've seen it, you'll find a whole new way of looking at the world in the next few chapters. You may not see fancy formulas flashing before your eyes when you finish this book, but I'm hopeful that you'll achieve an enlightenment akin to what Neo in *The Matrix* experiences when he learns that a computer code underlies his reality. Although I'm not as cool as Morpheus, I look forward to helping you emerge through the other end of the rabbit hole.

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