Calculus is about the very large, the very small, and how things change. The surprise is that something seemingly so abstract ends up explaining the real world.

On the cover we see a time lapse photograph of the star *Polaris*, commonly known as the "North Star." If one imagines a line drawn from the South Pole to the North Pole that extends infinitely into space, the star *Polaris* appears very nearly on this line. Hence as the Earth rotates, we the inhabitants of Earth, see the stars rotate around *Polaris*. The circular star-trails in this photograph are formed by the accumulated light, over a period of time, collected the camera's light-sensor. This process of accumulating light can be described precisely using the language of calculus as an "integral," something that will be introduced in this book.

The graph shown at the bottom is suggestive of the Fundamental Theorem of Calculus. The main plot is $y = f(x)$, the dashed plot shows the rate that f is changing, $y = f'(x)$. The rectangles between the dashed plot and the axis show the (signed) area accumulated by the rate. The piecewise-linear curve is an approximation of the function f, generated by looking at average rates over a given step-size. The dashed rectangles show the average rise and run over the step-size. It is our sincerest hope that this helps show that:

> **Accumulated rates of a function are equal to the value of the function.**

This is the essence of the Fundamental Theorem of Calculus, and one must not underestimate its strength and utility.

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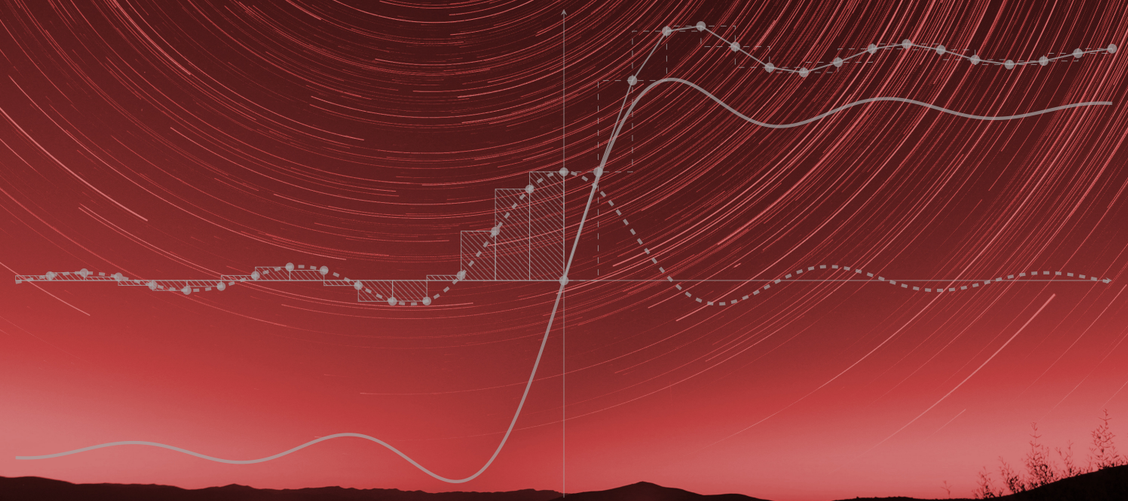

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