The Essence of Calculus

Andrei

Concept of ∞

What is infinity?

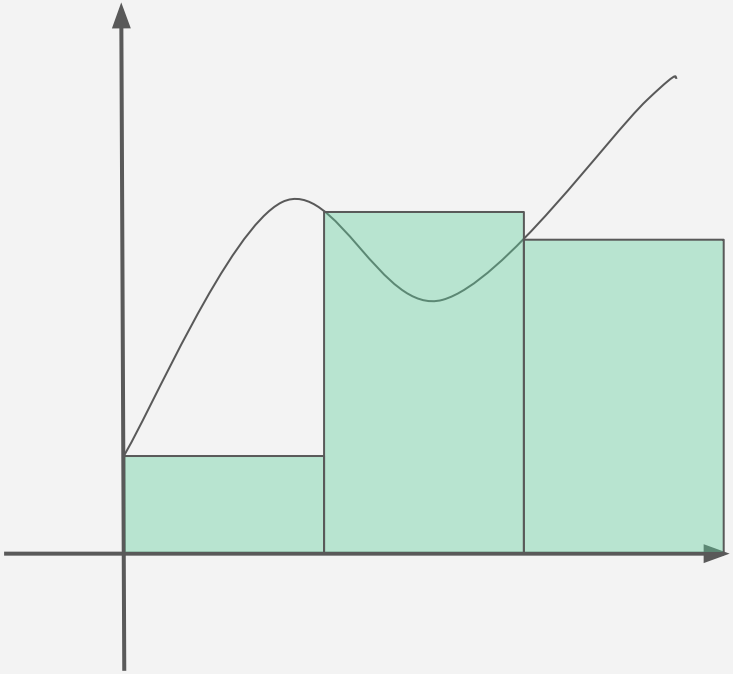
Infinity is not a number but rather a concept, the idea of a value larger than any finite number.

So then what is 1/∞?

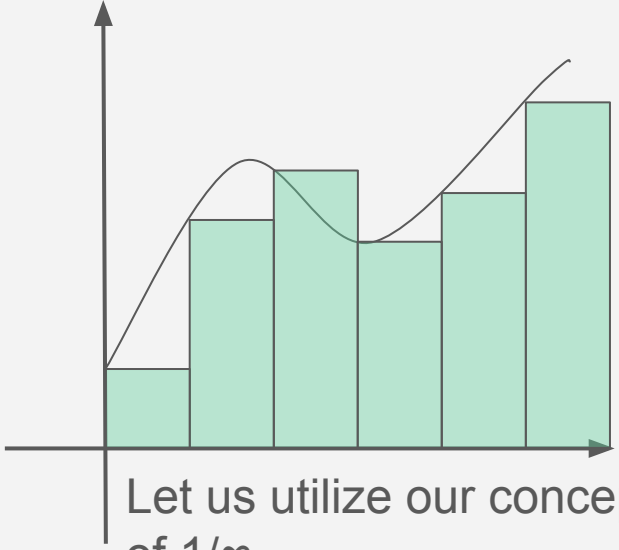
Infinity is not a number but rather a concept, the idea of a value larger than any finite number.

Riemann Sum

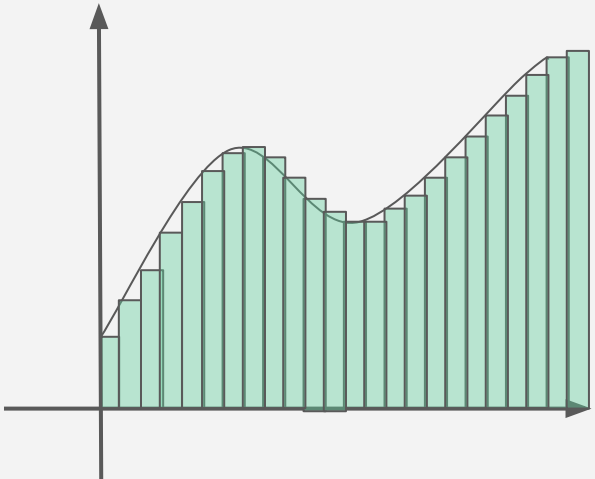
How can we find the area?



How can this estimate for area be more accurate?

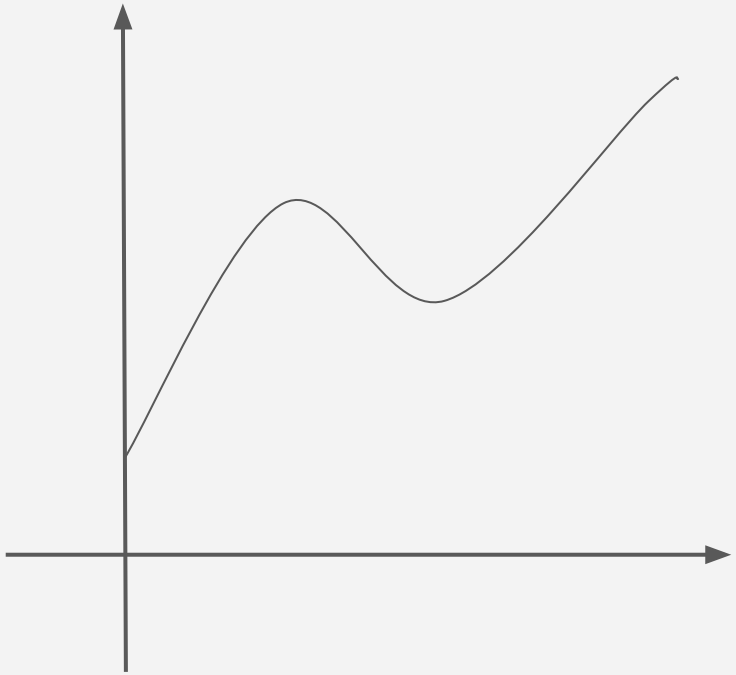


Let us utilize our concept of 1/∞

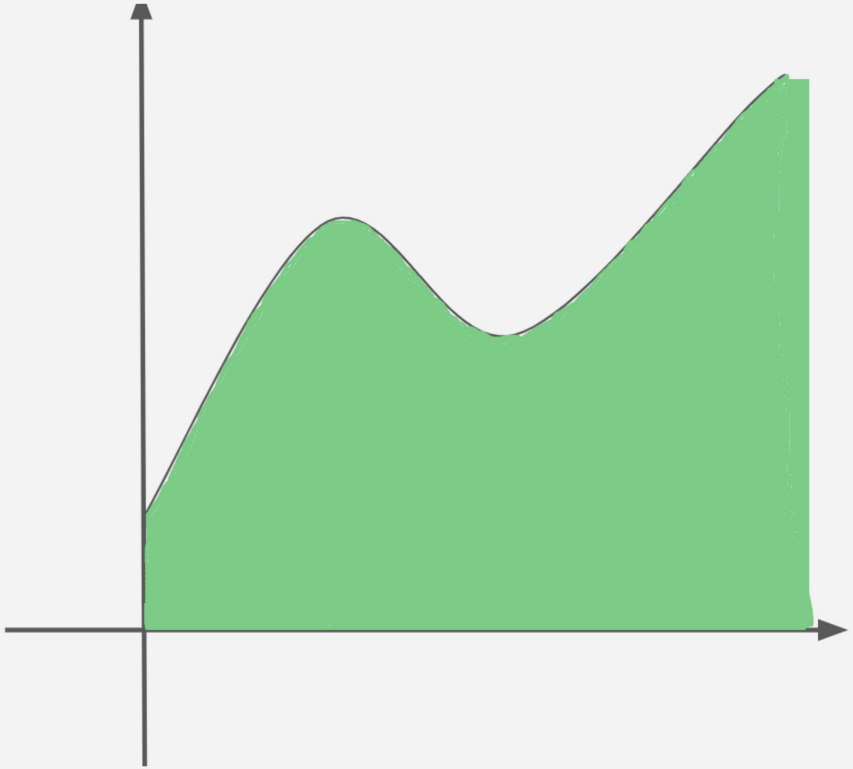


The Integral

Suppose below is the graph of function f(x).

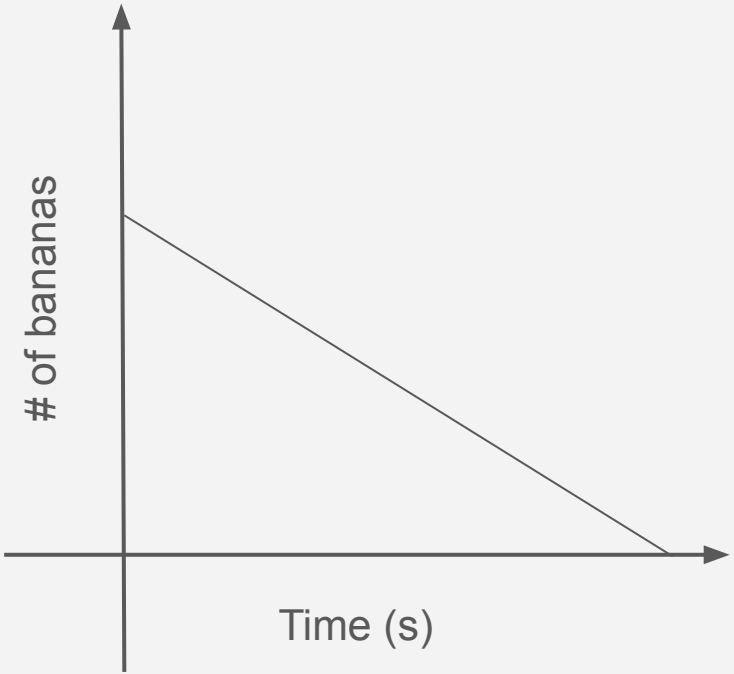


The the integral of f(x) over x, written as $\int f(x)dx$ is:

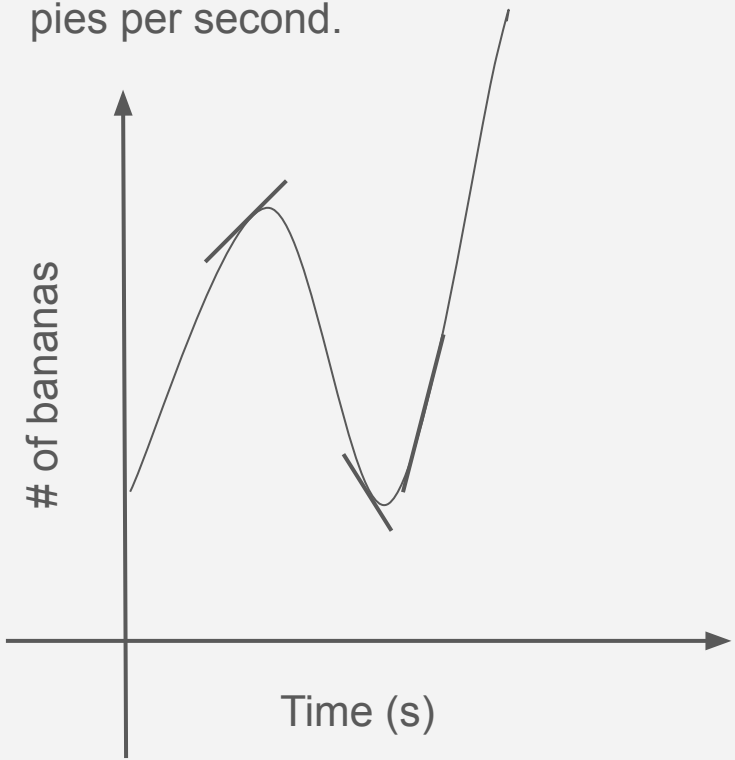


Slope

Let us say syoma eats 3 bananas per second, we can then graph our banana supply in the following way



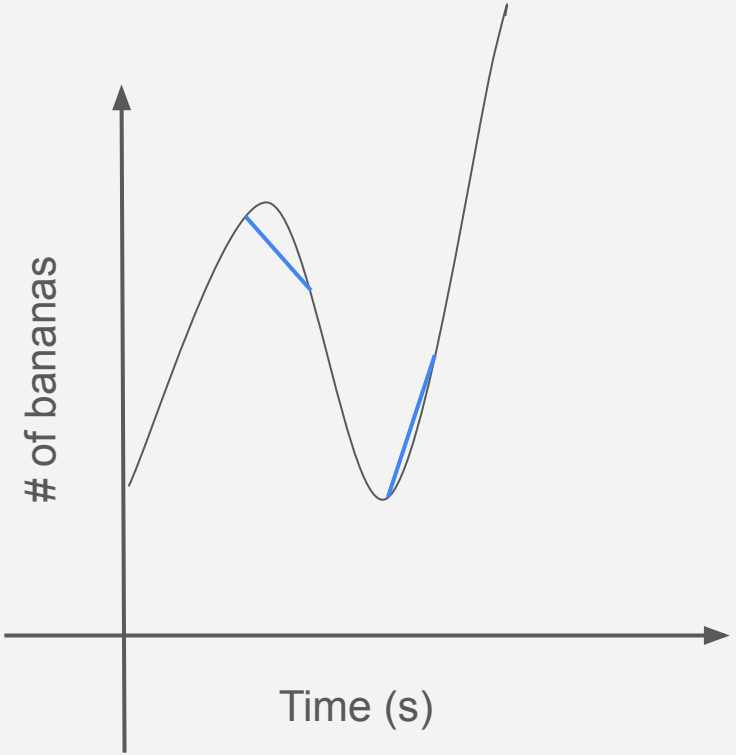
Let's say markus is feeling silly and makes $\frac{1}{8}(x-10)^3 + 1.5(x-10)^2 + 2.5(x-10) + 3$ pies per second.



For each point on f(x), there exists a slope.

Slope Continued

Let's step back and first look at some secant lines and their slope.



To find the slope of f(x) at a specific point we will need the slope of a secant line as the length of this secant line approaches 0. Written utilizing limits this is,

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

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The function whose values are the slope of f(x) for any x is often written as f prime.

Fundamental Theorem of Calculus

On the board