Miniproject 8: Riemann Sums

Overview: This miniproject focuses on the use of $\sum$-notation to estimate the area under a curve. Students will use Desmos to set up and evaluate Riemann sums to get the area under a curve that is not amenable to the Fundamental Theorem of Calculus. This miniproject is one of the four designated CORE miniprojects.

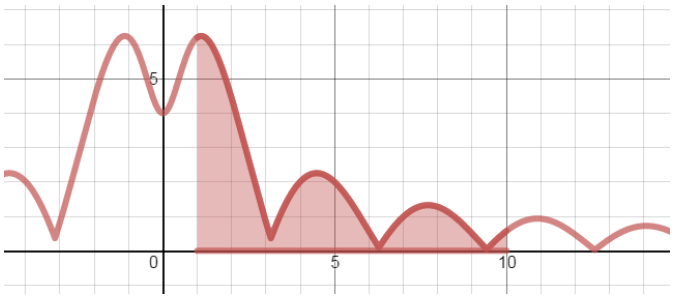
Prerequisites: Section 4.3 of *Active Calculus.*

This miniproject is one of the CORE miniprojects. All students must complete it.

For this miniproject you will be estimating the area under the curve

$$f(x) = \left| \frac{10x}{x^2+1} \sin(x) \right| + \frac{4}{x^2+1}$$

from $x = 1$ to $x = 10$.



Before you start, enter the function $f(x)$ into Desmos so that you can refer to it later.

1. Evaluate R_3 using Desmos.
2. Evaluate M_3 using Desmos.
3. Evaluate L_9 using Desmos.
4. Evaluate R_{100} using Desmos. You will probably want to use the $\sum$-notation capabilities of Desmos.
5. Evaluate R_{1000} using Desmos.
6. Write out an expression using a limit that will give the exact area under the curve $y = f(x)$ from $x = 1$ to $x = 10$.

Submission instructions: The writeup that you prepare is to be saved as a PDF file and submitted using Canvas. (You may use any program you want to write the writeup but the submission *must* be a PDF, or your work will be marked at Novice level and returned without comment. You may important screenshots to show the Desmos output for any steps. Just remember to be neat with your work.)