Pre-class worksheet 5: product and quotient rules

Calculus I, section 10
Due October 3, 2023 by 4:10 PM

Using the product and quotient rules as well as the formula $\frac{d}{dx}\sin(x) = \cos(x)$ from class, solve the following problems.

Problem 1. Find $\frac{d}{dx}x\sin(x)$.

Problem 2. If $f(x) = \frac{\sin(x)}{x}$, then compute $f'(x)$.

Challenge problem (4 points). (While the rest of the worksheet is graded for completeness, this problem is optional for completeness, but is worth 2 challenge points if correct.) For $f(x) = \frac{\sin(x)}{x}$ as in the previous problem, find $\lim_{x\to 0} f'(x)$.

Warning: with the tools we have, this problem is harder than it looks! Don't spend an excessive amount of time on it.