

MATH 223

Hints and Answers for Assignment 23
Some Problems Involving Leibniz' Rule

A: Prove by contradiction. Suppose

$$\lim_{x \rightarrow a} f(x) = B$$

where $B < 0$. Let $r = |B|/2$ and let \mathcal{N} be the r -neighborhood of B . Show that every number in \mathcal{N} is negative. Explain why there must be some neighborhood \mathcal{M} of a such that if $x \neq a$ is in \mathcal{M} , then $f(x)$ must lie in \mathcal{N} . Why does this lead to a contradiction?

B:

(1) $F'(x) = 12x$

(2) $F'(x) = 3$

(3) A direct calculation involves integration by parts. Here $F'(x) = \frac{e^2 - 1}{2}$.

C:. $F'(x) = \frac{\sin 12x}{x}$

D: Recall that $\int e^{-xy} dx = \frac{e^{-xy}}{-y}$.

$$G'(y) = \frac{e^{5y} - e^{-5y}}{y}$$