Homework due Friday, February 2, at 3:00 pm.

A. Let

\[ f(x) = \begin{cases} 
  e^{-1/x} & x \neq 0 \\
  0 & x = 0 
\end{cases} \]

Find (with justification), \( f^{(n)}(x) \) for all \( x \).

B. Suppose \( f \) is a differentiable function defined on \( \mathbb{R} \) and assume that \( f' \) is strictly increasing (that is: \( f(x) < f(y) \) if \( x < y \)). Prove that every tangent line of \( f \) intersects the graph of \( f \) only once.

C. Let \( f : \mathbb{R} \to \mathbb{R} \) be a functions so that

\[ f = f^{(4)} \]
\[ f(0) = f'(0) = f''(0) = f^{(3)}(0) = 0 \]

Prove that \( f(x) = 0 \) for all \( x \in \mathbb{R} \).

(Hint: Use Taylor’s Theorem.)

D. Rudin, Chapter 5 (page 114), problems # 26.

E. Rudin, Chapter 6 (page 147), problems # 1, 2, 5.