

Math 131A Section 6: Homework 7, Due 6/3 in TA session

1. Let us consider the function $f(x) = x \sin(\frac{1}{x})$ for $x \neq 0$.
 - (a) Show that f has a continuous extension \tilde{f} on $-1 \leq x \leq 1$. You may use the fact that $\sin(x)$ is a continuous function.
 - (b) Show that \tilde{f} is not differentiable at $x = 0$.

2. Let $f : (a, b) \rightarrow \mathbb{R}$ be differentiable at all points in (a, b) , and let $x \in (a, b)$. Suppose that $\lim_{x \rightarrow c} f'(x)$ exists and is finite. Show that this limit must be $f'(c)$.
 - 3-6. 20.20, 28.4, 28.8, 28.10.
 - 7-9. 29.3 29.12, 29.18.