

Homework 10

Due Monday, November 14 at 10am. Please upload a legible copy to Gradescope.

You may work together, but the solutions must be written up in your own words. Show all work and justify all answers.

1. Ross 29.2
2. Ross 29.5
3. Ross 29.13
4. Ross 29.17
5. Let $I \subset \mathbb{R}$ be an open interval and $f : I \rightarrow \mathbb{R}$ differentiable such that for all $x \in I$, $f'(x) \neq 0$. Prove that f is either strictly increasing or strictly decreasing.
6. Ross, 32.6
7. Use the previous problem to show that $f : [a, b] \rightarrow \mathbb{R}$, $f(x) = x$ is integrable, and find $\int_a^b f$.
8. Define $f : [0, 1] \rightarrow \mathbb{R}$ by $f(x) = x$ if $x \in \mathbb{Q}$ and $f(x) = 0$ if $x \notin \mathbb{Q}$. Compute $U(f)$ and $L(f)$. Is f integrable?