Extra Credit Assignment - MTH 5111 - Real Analysis 2 - Dr. Kanishka Perera - Spring 2025

Name: _____

This extra credit assignment is worth 25 points. Please submit your work in class on Monday, February 24. No late work will be accepted.

Let $(X, \mathcal{M}, \mu)$ be a measure space. Show that if $f : X \to [0, \infty]$ is measurable, then

$$\lim_{n \to \infty} \int_X n \log \left(1 + \frac{f}{n} \right) d\mu = \int_X f \, d\mu.$$

(Hint: Use the dominated convergence theorem.)