

Name:

Warm-up #16

Suppose f is integrable on $[1, n]$ for each integer $n \geq 1$. Define

$$\int_1^\infty f(x) dx = \lim_{n \rightarrow \infty} \int_1^n f(t) dt$$

provided this limit exists. Suppose that

- (a) $f \geq 0$
- (b) f is decreasing.

Show that the limit above exists if and only if $\sum_n f(n)$ converges. (This is the integral test for series.)