Problem of the Week-7: Some Improper Integrals

Determine whether the following statements are true.

1. If $\sum_{n=1}^{\infty} f(n)$ converges where $f(x) \geq 0, \forall x \in \mathbb{R}$ and is continuous on $\mathbb{R}$, then $\int_1^{\infty} f(x)dx$ converges as well.

2. If $f(x) \geq 0, \forall x \geq 0$, is continuous on $[0, \infty]$ and $\int_0^{\infty} f(x)dx$ converges then $\lim_{x\to\infty} f(x) = 0$.

As always, show your work, fully explain and justify your answer.
(Hint: be suspicious!)

Posting Date 4/10/15. Submit solutions to Noah Aydin, Mathematics Department, RBH 319 (e-mail or hard-copy, but hard copy submissions must include a time stamp) by 5 pm on 4/27/15.