Re: divergence of improper integral implies divergence of series

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- *From*: SusanP <susanp@xxxxxxxxxxx>
- *Date*: Sat, 19 Nov 2005 22:17:20 EST

SusanP wrote:
> Let f: [0, oo)−> [0, oo) and [sum](a_k) be given. Assume
> that for all sufficiently large k and all x in [k, k+1),
> f(x)<=(a_k). Prove that divergence of the improper
> integral (from 0 to oo) of f(x) implies divergence of
> [sum](a_k). (Do I use the comparison test here?

RG Vickson wrote:

Well...what do you think? Yes, or no? Try giving an answer first, then maybe if you have made an error, people will be willing to help. One small hint: draw a picture.

R,G. Vickson

Ok, so I think I need to compare (a_k) with the
integral (k to k+1) f(x)dx.
What does the inequality f(x) <= a_k on [k,k+1) tell me
about this integral? I think it says that:
If f(x) <= a_k on [k,k+1), then
integral(k to k+1)f(x)dx <= integral(k to k+1)(a_k)dx.

Then the integral(1 to oo)f(x)dx=
[sum](1 to oo)integral (1 to k+1) f(x)dx.

I got this far... but I don't see how I can prove that
f(x) diverges and thus that this proves that [sum](a_k)
diverges....
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- Prev by Date: ***Re: More of an Algorithems question***
- Next by Date: ***Re: bounded variation***
- Previous by thread: ***divergence of improper integral implies divergence of series***
- Next by thread: ***Re: divergence of improper integral implies divergence of series***
- Index(es):

- ***Date***
- ***Thread***