

## The Integral Test for Convergence

Use this test only if all  $a_n$  are positive and are decreasing (to zero).

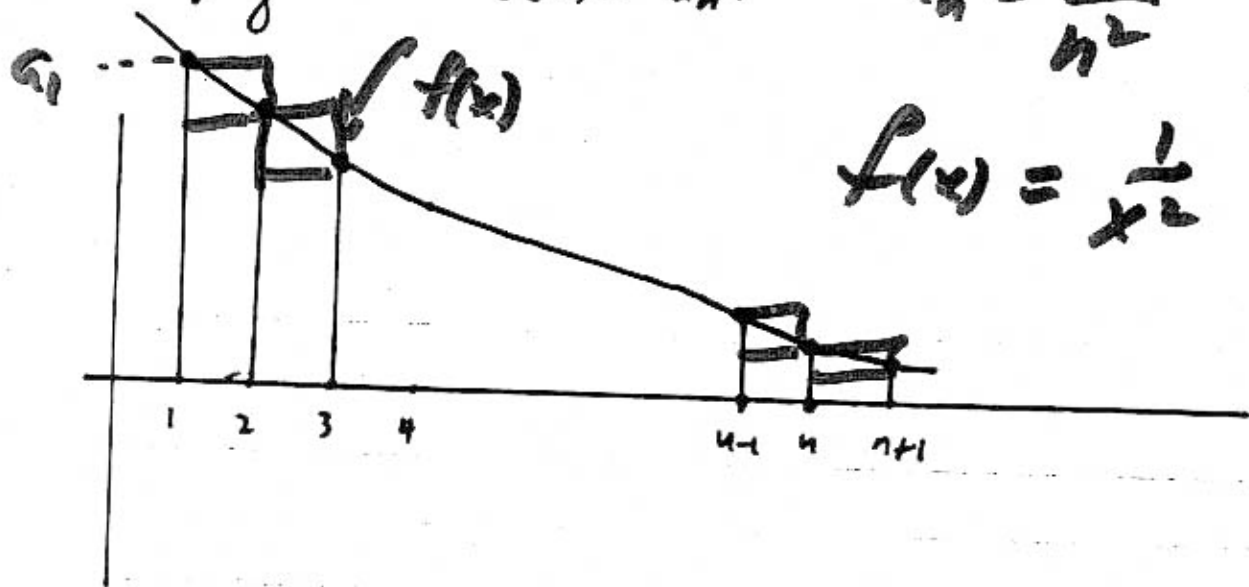
Let  $f(x)$  be a positive, continuous, decreasing function

satisfying:

$$f(n) = a_n.$$

$$a_n = \frac{1}{n^2}$$

$$f(x) = \frac{1}{x^2}$$



Then

$$\sum_{k=2}^{n+1} a_k \leq \int_1^{n+1} f(x) dx \leq \sum_{k=1}^n a_k,$$

So the infinite series  $\sum_{k=1}^{\infty} a_k$  and the improper integral  $\int_1^{\infty} f(x) dx$  either both converge or both diverge.