

MATH 171

Test 3

May 9, 2005

Name: _____

- No books, notes, or calculators are allowed.
- Please show all your work.

1. (6 points) Give the definition of an integrable function.

2. (10 points) State the Fundamental Theorem of Calculus.

3. (12 points) Prove that the harmonic series diverges.

4. (10 points) Evaluate the integral: $\int_1^{\infty} \frac{x}{(x^2 + 1)^3} dx$.

5. (12 points)

(a) Prove that if $\sum_{k=1}^{\infty} a_k$ converges, then its partial sums s_n are bounded.

(b) Show that the converse of part (a) is false. Namely, show that a series $\sum_{k=1}^{\infty} a_k$ may have bounded partial sums and still diverge.