# Problem Set
# Sections 11.3

## The Integral Test

The $p-$ series

$$\sum_{n=1}^{\infty} \frac{1}{n^p}$$

converges if $p > 1$ and diverges if $p \leq 1$.

---

Suppose $f(k) = a_k$, where $f$ is a continuous, positive, decreasing function for $x \geq n$ and $\sum_{n=1}^{\infty} a_n$ is convergent. If $R_n = s - s_n$, then

$$\int_{n+1}^{\infty} f(x)dx \leq R_n \leq \int_{n}^{\infty} f(x)dx$$

# Problem 1

Determine whether the series is convergent or divergent $\sum_{n=1}^{\infty} \frac{1}{n^{\sqrt{2}}}$

## Problem 2

Determine whether the series is convergent or divergent $\sum_{n=1}^{\infty} \frac{\sqrt{n}+4}{n^2}$

# Problem 3

Determine whether the series is convergent or divergent $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{1+n^{3/2}}$

## Problem 4

Determine whether the series is convergent or divergent $\sum_{n=2}^{\infty} \frac{\ln n}{n^2}$

## Problem 5

Explain why the Integral Test can't be used to determine whether the series is convergent $\sum_{n=1}^{\infty} \frac{\cos \pi n}{\sqrt{n}}$.

# Problem 6

Find the values of $p$ for which the series is convergent.

$$\sum_{n=1}^{\infty} n(1+n^2)^p$$

## Problem 7

Given that $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$ find the sum of $\sum_{n=3}^{\infty} \frac{1}{(n+1)^2}$

# Problem 8

How many terms of the series $\sum_{n=1}^{\infty} \frac{1}{n(\ln n)^2}$ would you need to add to find its sum to within 0.01?