May 7,2012

Test♯2 Math311, sec 1

Net Time Allowed: 45 minutes

Name: **ID ♯ :** **Serial:**

Exercise1:(8 pts)

Let $X = (x_n)$ and $Y = (y_n)$ be real sequences.

1. Show that if there exist $a \in \mathbb{R}$ and $p \in \mathbb{N}$ such that $| x_n |^{\frac{1}{n}} \leq a < 1$, for $n \geq p$ then $\sum x_n$ is absolutely convergent.
2. Show that if $\sum x_n$ is absolutely convergent then it is convergent.
3. Show that if for some $k \in \mathbb{N}$, $0 \leq x_n \leq y_n$, $n \geq k$ and $\sum y_n$ is convergent then $\sum x_n$ is convergent.

Exercise3:(06 pts)

Test the series $\displaystyle\sum_{n=0}^{\infty} \frac{n}{n^2 + 1}$ for convergence or divergence.

Exercise2:(06 pts)
Determine whether the following series are convergent or divergent? Find the sum of the series if it is convergent? Make sure you justify your answers and show all of your work.

a) $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n 3^n}{4^{n+1}}$

b) $\displaystyle\sum_{p=1}^{\infty} \frac{1}{p(p+3)}$