Math 128 : Calculus 2 for the Sciences **Winter 2016**

Lecture 28: March 14, 2016

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28.1 Absolute/Conditional Convergence

Definition 28.1 *A series* $\sum_{n=1}^{\infty}$ *is*

- *Convergent if* $\sum a_n = a_1 + a_2 + \dots$ *is finite*
- *Absolutely convergent if the series of absolute values* $\sum \mid a_n \mid$ *is convergent*
- *Conditionally convergent if it is convergent but not absolutely convergent :* $\sum a_n$ *converges, but* $\sum \mid a_n \mid$ *does not*

Theorem 28.2 *Absolute Convergence* $\implies$ *Convergence*

Why?

- If an alternating series converges absolutely, there is no need for AST
- Any rearrangements of the series results in the same sum
- Gives us a way to test convergence of a series that has negative terms, but is not alternating

28.2 Ratio Test

Theorem 28.3 -

(a) If $\lim_{n\to\infty} |\frac{a_n+1}{a_n}| = L < 1$*, then* $\sum a_n$ *is absolutely convergent*

(b) If $\lim_{n\to\infty} |\frac{a_n+1}{a_n}| = L > 1$ *or* $\lim_{n\to\infty} |\frac{a_n+1}{a_n}| = \infty$*, then* $\sum a_n$ *diverges*

(c) If $\lim_{n\to\infty} |\frac{a_n+1}{a_n}| = 1$*, then* ***NO CONCLUSION*** *about the convergence or divergence of* $\sum a_n$ *can be made*

End of Lecture Notes
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