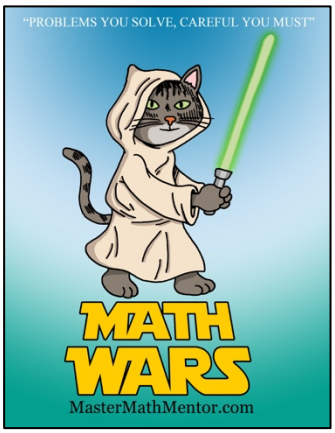
Math Wars – BC Calculus
Topic 214 – Series Convergence



Maximum Time: 7.5 Minutes

Directions: To start, you need to download the Math Wars application on your cell phone: Use the QR code or the url: https://mastermathmentor.com/mmm/mathwars.ashx?key=214

When ready, start the timer and then solve the problems below, entering your choice, A, B, C, D and pressing Submit for each problem when you are sure of your answer. When complete, stop the timer. You will see problems you got correct in green and incorrect in red. You will receive a score based on how many problems you got right and your time. A perfect score is all problems correct using half the maximum time or less. You can text or email your friends with your results.

1. (1 pt) Consider the following two statements: What words describe when they are true?

   i. If the series $\sum_{n=1}^{\infty} a_n$ is convergent, then the sequence $\{a_n\}$ is convergent to zero.

   ii. If the series $\sum_{n=1}^{\infty} a_n$ is divergent, then the sequence $\{a_n\}$ is divergent.

   A. $\begin{cases}\text{i. always}\\ \text{ii. always}\end{cases}$ B. $\begin{cases}\text{i. always}\\ \text{ii. sometimes}\end{cases}$ C. $\begin{cases}\text{i. sometimes}\\ \text{ii. always}\end{cases}$ D. $\begin{cases}\text{i. sometimes}\\ \text{ii. sometimes}\end{cases}$

2. (3 pts) Which of the following series must diverge because of the *n*th term test?

   I) $\sum_{n=1}^{\infty} 1.1^n$ II) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ III. $\sum_{n=1}^{\infty} \tan\frac{(2n-1)\pi}{4}$

   A. I only B. I and II C. I and III D. II and III

3. (5 pts) Find the sum: $\sum_{n=1}^{\infty} \frac{2}{n+1} - \frac{2}{n+3}$ if it exists

   A. $\frac{2}{3}$ B. 1 C. $\frac{5}{3}$ D. Divergent

4. (7 pts) What is the best integer approximation to $\frac{400}{499}+\frac{404}{504}+\frac{408}{509}+\frac{412}{514}+\ldots+\frac{4000}{4999}$

   A. 721 B. 800 C. 811 D. 832

5. (9 pts) Which of the following series could possibly converge because of the *n*th term test?

I. $\sqrt{\frac{1}{11}}+\sqrt{\frac{4}{14}}+\sqrt{\frac{9}{19}}+\sqrt{\frac{16}{22}}+\ldots$ II. $\frac{1}{3}+\frac{2}{9}+\frac{3}{27}+\frac{4}{81}+\ldots$ III. $e+\frac{\sqrt{e}}{2}+\frac{\sqrt[3]{e}}{3}+\frac{\sqrt[4]{e}}{4}+\frac{\sqrt[5]{e}}{5}+\ldots$

A. I only B. II only C. III only D. II and III only