

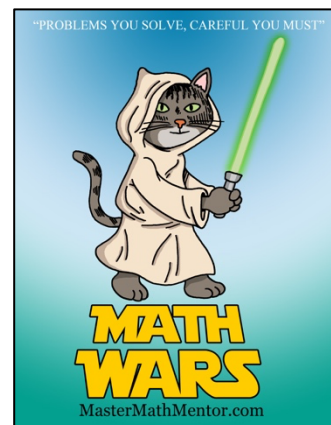
Math Wars – BC Calculus

Topic 218 – Ratio and Root Test



Maximum Time: 8.5 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=218>



When ready, start the timer and then solve the problems below, entering your choice, A, B, C, D and pressing 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 series $\sum_{n=1}^{\infty} \frac{n^3}{3^n}$. If the ratio test is applied, which expression would have to be verified to show that the series converges.

A. $\lim_{n \rightarrow \infty} \frac{n^3}{3^n} < 1$

B. $\lim_{n \rightarrow \infty} \frac{n^3}{3^n} > 1$

C. $\lim_{n \rightarrow \infty} \frac{(n+1)^3}{3n^3} < 1$

D. $\lim_{n \rightarrow \infty} \frac{3n^3}{(n+1)^3} < 1$

2. (3 pts) Using the ratio test to $\sum_{n=0}^{\infty} \frac{n!}{a^n}$ where $a > 0$, the result is

- A. Must converge
C. Must diverge

- B. Could converge depending on a
D. Inconclusive

3. (5 pts) The ratio test is applied to series I and the root test is applied to series II. Which of them gives an inconclusive result?

I. $\sum_{n=0}^{\infty} \frac{(-1)^n}{n^2 + n}$

II. $\sum_{n=1}^{\infty} \left(\frac{3n+2}{3-2n} \right)^{2n}$

A. I only

B. II only

C. I and II

D. Neither

4. (7 pts) Using the ratio test on $\sum_{n=1}^{\infty} \frac{8^n}{n(-2)^{n+1}}$, the result is _____ telling us the series is _____

A. 1, inconclusive

B. -4, convergent

C. 0, convergent

D. 4, divergent

5. (9 pts) Using the ratio test on $\sum_{n=0}^{\infty} \frac{5^{\frac{1}{2}n+1} n^2}{4^{n+1} (n+1)}$, the result is _____ telling us the series is _____

A. $\frac{\sqrt{5}}{4}$, Convergent

B. $\frac{5}{2}$, Divergent

C. $\frac{5}{4}$, Divergent

D. 1, inconclusive