

Quiz 3

Mar. 9, 2006

1. (10pts) Determine if the series is absolutely convergent, conditionally convergent or divergent.

$$\sum_{k=1}^{\infty} (-1)^k \frac{k^3}{(3k)!}$$

Ans:

$$\begin{aligned} \lim_{k \rightarrow \infty} \left| \frac{a_{k+1}}{a_k} \right| &= \lim_{k \rightarrow \infty} \left| \frac{(-1)^{k+1} (k+1)^3 (3k)!}{(3k+3)! (-1)^k k^3} \right| \\ &= \lim_{k \rightarrow \infty} \left(\frac{k+1}{k} \right)^3 \frac{1}{(3k+3)(3k+2)(3k+1)} \\ &= 0 \end{aligned}$$

By Ratio Test, since the limit is less than 1, the series is absolutely convergent.

Write your solutions as complete as possible. Working time: 15 minutes.