

Name: Solutions

Section: 11 12 13

Determine if the following series converge absolutely, converge conditionally, or diverge. You may use any test, clearly state which tests you are using.

1. $\sum_{n=1}^{\infty} (-1)^n \frac{3^n}{n!}$ Ratio test:

$$\left| \frac{a_{n+1}}{a_n} \right| = \left| \frac{(-1)^{n+1} 3^{n+1}}{(n+1)!} \cdot \frac{n!}{(-1)^n 3^n} \right| = \frac{3}{n+1} \rightarrow 0$$

Series converges absolutely

2. $\sum_{n=1}^{\infty} (-1)^n \frac{1}{n^{1/3}}$

$$\sum_{n=1}^{\infty} \left| (-1)^n \frac{1}{n^{1/3}} \right| = \sum_{n=1}^{\infty} \frac{1}{n^{1/3}} \text{ diverges (p-series } p = \frac{1}{3} \leq 1)$$

$$\sum_{n=1}^{\infty} (-1)^n \frac{1}{n^{1/3}} \text{ AST: } b_n = \frac{1}{n^{1/3}} \text{ pos, dec.}$$

$$b_n \rightarrow 0$$

Series converges

\therefore series converges conditionally