

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 1.6

Math 2000 Worksheet

WINTER 2020

For practice only. Not to be submitted.

1. Determine whether each of the following series is absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{i=2}^{\infty} (-1)^{i+1} \frac{\ln(i)}{i}$ (b) $\sum_{i=1}^{\infty} \frac{(-1)^i}{3i^2 + 1}$ (c) $\sum_{i=0}^{\infty} (-1)^{i+1} \frac{\sqrt{i}}{1 + 4\sqrt{i}}$

(d) $\sum_{i=1}^{\infty} (-1)^i \frac{\sqrt[3]{i}}{i}$ (e) $\sum_{i=1}^{\infty} \frac{(-1)^i}{e^{i^3}}$ (f) $\sum_{i=1}^{\infty} \frac{\cos(i\pi)}{i^{\frac{1}{4}}}$

2. We wish to approximate $\sum_{i=1}^{\infty} \frac{(-1)^i}{4^i i!}$. Use the remainder estimate for the Alternating Series Test and the sum of the first 5 terms of the series to determine the range of values in which the sum of the series must fall.

3. Use the Ratio Test or the Root Test to determine whether each of the following series converges or diverges, if possible.

(a) $\sum_{i=1}^{\infty} (-1)^i \frac{i^3}{3^i}$ (b) $\sum_{i=0}^{\infty} \frac{4^i}{i!}$ (c) $\sum_{i=1}^{\infty} \left(\frac{3i}{i+2} \right)^i$

(d) $\sum_{i=0}^{\infty} i \left(\frac{1}{7} \right)^{2i}$ (e) $\sum_{i=1}^{\infty} \frac{i^i}{i!}$ (f) $\sum_{i=1}^{\infty} \frac{1}{i^3 \sqrt{i}}$

(g) $\sum_{i=1}^{\infty} (-1)^{i+1} \left(\frac{3}{2} - \sqrt{i} \right)^i$ (h) $\sum_{i=1}^{\infty} \frac{2^i}{i^2 + 6}$ (i) $\sum_{i=1}^{\infty} \frac{(4i)!}{(i!)^3}$