CHAPTER 9: SERIES

MATH 2019 – SPRING 2008

1. Determine whether the series is convergent or divergent. If the series converges, find its sum where possible. You should know in which situation you can find the actual sum.

(a) $\displaystyle\sum_{k=1}^{\infty} \frac{1}{\arctan k}$ (b) $\displaystyle\sum_{n=1}^{\infty} \frac{13n^5 - 11n^3 + 7}{23n^6 - 19n^4 + 17}$ (c) $\displaystyle\sum_{k=1}^{\infty} \frac{(-2)^{3k-1}}{(-3)^{2k+1}}$

(d) $\displaystyle\sum_{n=1}^{\infty} n^2 e^{-n^3}$ (e) $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt{5k^6 + 3k + 21}}{7k^3 + 14k^2 + 93}$ (f) $\displaystyle\sum_{n=1}^{\infty} \frac{(2n+1)!}{5^n}$

(g) $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n}{\ln n}$ (h) $\displaystyle\sum_{n=2}^{\infty} \ln\left(\frac{3n^2 - 1}{2 + 2n^2}\right)$ (i) $\displaystyle\sum_{k=1}^{\infty} \frac{\sqrt{k^3 + 1}}{k^3 - 2k^2 + 5}$

(j) $\displaystyle\sum_{n=2}^{\infty} \frac{n}{(\ln n)^2}$ (k) $\displaystyle\sum_{k=1}^{\infty} \left(\frac{1}{4k+1} - \frac{1}{4k+9}\right)$ (l) $\displaystyle\sum_{k=1}^{\infty} \sec\left(\frac{3k+1}{2+k^2}\right)$

(m) $\displaystyle\sum_{n=0}^{\infty} \frac{(-5)^{n+2}}{2^{2n+1}}$ (n) $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n n^2 \ln n}{2^n}$

2. Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

(a) $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n}{n \ln n}$ (b) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+5}{\sqrt[3]{8n^7 + n^2}}$

(c) $\displaystyle\sum_{k=1}^{\infty} \frac{(-1)^{k+1}\, 3k}{\sqrt{k^3 + 4}}$ (d) $\displaystyle\sum_{n=1}^{\infty} (-1)^{n-1} \frac{1 \cdot 3 \cdot 5 \cdots (2n-1)}{5^{2n-3}\, n!}$

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