AUC apCalculus BC

Assignment 14 (Review Assignment 01)

Problem 7.4. *Study the convergence of the following series:*

(1) $\sum_{n=1}^{+\infty} \frac{1}{(5n+4)^6}$.

(2) $\sum_{n=1}^{+\infty} \sin^5\left(\frac{n^3+1}{n^{3.5}+4\sin(n^n)}\right)$.

(3) $\sum_{n=1}^{+\infty} \frac{e^{4n}}{(n+2)!}$.

(4) $\sum_{n=1}^{+\infty} \frac{n!}{e^{3n^2}}$.

(5) $\sum_{n=1}^{+\infty} \sin^2\left(\frac{7^n}{8^n}\right)$.

Problem 8.1. *Study the convergence of the following series:*

(1) $\sum_{n=1}^{+\infty} \frac{n^3-\cos(e^n)n+1}{5n^5+1}$.

(2) $\sum_{n=1}^{+\infty} \frac{5n^{100}\cdot 7^n}{2^{3n}}$.

(3) $\sum_{n=1}^{+\infty} \sin^7\left(\frac{n^3+1}{n^{3.2}+4\sin(n^n)}\right)$.

(4) $\sum_{n=1}^{+\infty} \frac{n!}{n^{50}e^{2n}}$.

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

(6) $\sum_{n=1}^{+\infty} \frac{1}{n\ln^2(n)}$.

(7) $\sum_{n=1}^{+\infty} \sin(n)$.

Problem 10.1. *Study the convergence of the following series:*

(1) $\sum_{n=1}^{+\infty} \frac{n^2-1}{(3n-1)^7}$.

(2) $\sum_{n=1}^{+\infty} \sin^3\left(\frac{n^2+1}{n^{2.1}+4\sin(e^n)}\right)$.

(3) $\sum_{n=1}^{+\infty} \frac{n^5 n!}{e^{n^2}}$.

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

(5) $\sum_{n=1}^{+\infty} \frac{2^{n+2}-3^{n+4}}{10^n}$.

(6) $\sum_{n=1}^{+\infty} \frac{6^n}{7^n}$.

(7) $\sum_{n=1}^{+\infty} \frac{1}{n\ln^3(n)}$.

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11. On Absolute and Conditional Convergence, Alternating Series and their Error Theorems

PROBLEM 11.1. *(70 points) Study the convergence of the following series:*

(1) $\sum_{n=1}^{+\infty} \frac{(-1)^n(6n+11)}{2n^2+7}$.
(2) $\sum_{n=1}^{+\infty} (-1)^n e^{-n^3}$.
(3) $\sum_{n=1}^{+\infty} \frac{(-1)^n}{n^{8/9}}$.
(4) $\sum_{n=1}^{+\infty} \frac{(-1)^n}{\sqrt{n+3}}$.
(5) $\sum_{n=1}^{+\infty} (-1)^n \sin(\frac{1}{n})$.
(6) $\sum_{n=1}^{+\infty} (-1)^{n^2} n^2 (1-\cos(\frac{1}{n}))$.

PROBLEM 11.2. *(15 points)*

(1) *Give the definition of Alternating series.*
(2) *Give the definition of Conditionally convergent series.*
(3) *Give the definition of Absolutely convergent series.*
(4) *State the Theorem that relates Absolute convergence and Convergence.*
(5) *Give the definition of a Cauchy sequence.*
(6) *Give the statement of the Alternating series test and its Error formula.*

PROBLEM 11.3. *(15 points)*
Find a rational approximation of the following limits within an error of $\frac{1}{10000}$

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