

Chapter 10 AP Problems

No calculator allowed.

1. Which of the following sequences is/are not bounded?

I. $a_n = \sqrt{2n} - \sqrt{n+1}$

II. $b_n = 2 - \frac{5}{n}$

III. $c_n = 2 \sin(\pi n^2)$

A. I only

B. I and II only

C. II only

D. II and III only

E. I, II and III

2. Consider the series defined by $S_k = \sum_{n=1}^k \frac{1}{n^2 + 3n + 2}$.a. Evaluate S_2 and S_3 .b. Using the method of partial fractions, rewrite the expression $\frac{1}{n^2 + 3n + 2}$ as a sum/difference of two fractions.

c. Using the result of part (b), evaluate $S = \sum_{n=1}^{\infty} \frac{1}{n^2 + 3n + 2}$.

3. Which of the following series converges?

I. $\sum_{n=1}^{\infty} \frac{1}{n + 2\sqrt{n}}$

II. $\sum_{n=2}^{\infty} \frac{n}{\sqrt{n^5 - 1}}$

III. $\sum_{n=1}^{\infty} \frac{\ln n}{n^2}$

- A. I and II only
B. II and III only
C. I and III only
D. II only
E. III only

4. Which of the following series converges absolutely?

I. $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{1.1^n}$

II. $\sum_{n=1}^{\infty} \frac{(-1)^n}{n \cos(\pi n)}$

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

A. I only

B. II only

C. III only

D. I and II only

E. I and III only

5. For which of the following series is the Ratio Test inconclusive?

A. $\sum_{n=1}^{\infty} \frac{1}{n!}$

B. $\sum_{n=1}^{\infty} \frac{2^n}{n^2}$

C. $\sum_{n=1}^{\infty} \frac{3n}{2n^3 + 1}$

D. $\sum_{n=1}^{\infty} \frac{n!}{n^3}$

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

6. Consider the function F defined by the power series $\sum_{n=0}^{\infty} (-1)^n \cdot x^n$.

a. Write the first three nonzero terms and the general term for $F(x^2)$.

b. Determine the interval of convergence of $F(x^2)$. Show the work that leads to your answer.

c. Given that $F(x^2) = \frac{1}{a + bx^c}$, find the values of a , b , and c .

d. Evaluate the improper integral $\int_0^{\infty} F(x^2) dx$. Show the work that leads to your conclusion.

7. In the Maclaurin series expansion of $f(x) = 8(x + 4)^{3/2}$, what is the coefficient of the x^3 term?

A. -3

B. $-\frac{3}{8}$

C. $-\frac{1}{16}$

D. $\frac{3}{8}$

E. $\frac{3}{2}$