

1) Which of the following sequences converge?

I.  $\left\{ \frac{3n^5}{7n^4 - 1} \right\}$

II.  $\left\{ \frac{\sin n}{5^n} \right\}$

III.  $\left\{ \frac{n!}{(n+1)!} \right\}$

(A) I only

(B) II only

(C) I and III only

(D) II and III only

(E) III only

2) Which of the following sequences diverge?

I.  $\left\{ \frac{n}{Lnn} \right\}$

II.  $\left\{ \left( \frac{3e}{13\cos\pi} \right)^n \right\}$

III.  $\left\{ \frac{n!}{(n+2)!} \right\}$

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) I, II, and III

3) Which of the following series diverge?

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

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

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

(A) I only

(B) II only

(C) III only

(D) I and III only

(E) I, II, and III

4) What are all values of  $k$  for which the infinite series  $\sum_{n=1}^{\infty} \left(\frac{k}{7}\right)^n$  diverges?

- (A)  $|k| > 7$       (B)  $|k| \geq 7$       (C)  $|k| > 1$   
(D)  $|k| \geq 1$       (E)  $k = 0$

5) If  $f(x) = \sum_{n=1}^{\infty} \left(\left(\frac{1}{2} - \tan x\right)^3\right)^n$ , then  $f\left(\frac{\pi}{4}\right) =$

- (A)  $\frac{1}{7}$       (B)  $\frac{8}{9}$       (C)  $-\frac{1}{9}$       (D) 8      (E) divergent

6) Which of the following series diverge?

I.  $\sum_{n=1}^{\infty} \frac{n+2}{n^2+1}$       II.  $\sum_{n=1}^{\infty} \frac{n!}{2^n}$       III.  $\sum_{n=1}^{\infty} \left(\frac{2n-1}{1+n}\right)^n$

- (A) I only      (B) III only      (C) I and III only  
(D) II and III only      (E) I, II, and III

7) Which of the following series are convergent?

I.  $\sum_{n=1}^{\infty} n^{-.9}$       II.  $\sum_{n=1}^{\infty} \frac{3^n}{n+5^n}$       III.  $\sum_{n=1}^{\infty} \frac{n}{1+4n}$

- (A) I only      (B) II only      (C) III only  
(D) I and II only      (E) II and III only

8) Which of the following series are conditionally convergent?

I.  $\sum_{n=0}^{\infty} \frac{(-1)^n}{n^3}$       II.  $\sum_{n=0}^{\infty} \frac{(-1)^n}{n}$       III.  $\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n^2}$

- (A) I only      (B) II only      (C) III only  
(D) I and II only      (E) I and III only

9) Which of the following series are convergent using the Ratio Test?

I.  $\sum_{n=0}^{\infty} \frac{1}{n^2}$       II.  $\sum_{n=0}^{\infty} \frac{n}{3^n}$       III.  $\sum_{n=0}^{\infty} \frac{2^n}{\sqrt{n}}$

- (A) I and III only      (B) II only      (C) III only  
(D) I and II only      (E) II and III only

10) Which of the following test will establish  $\sum_{n=1}^{\infty} \frac{2}{n(n+2)}$  is convergent?

- I. Direct Comparison Test with  $\sum_{n=1}^{\infty} 2n^{-2}$   
II. Limit Comparison Test with  $\sum_{n=1}^{\infty} n^{-2}$   
III. Direct Comparison Test with  $\sum_{n=1}^{\infty} 2n^{-1}$

- (A) I only      (B) II only      (C) III only      (D) I and II only      (E) II and III

BC Calculus '17-18  
Numerical Series Test  
Calculator Allowed

Name \_\_\_\_\_

Score \_\_\_\_\_.

1. Use the Integral Test to determine if  $\sum_{n=1}^{\infty} n^2 e^{-n^3}$  is convergent or divergent.

2. Use the Ratio Test to determine if  $\sum_{n=1}^{\infty} \frac{2^n \cdot n^3}{n!}$  is convergent or divergent.

3. Determine if  $\sum_{n=1}^{\infty} \frac{\sqrt{n}}{(n+4)^2}$  is convergent or divergent.