BC Calculus Unit 10 "Tests for Convergence" Quiz Review WS #1

Calculators Allowed:

1. Which of the following series converges?

(A) $\sum_{n=1}^{\infty} (-1)^n \left(\frac{n+3}{3n} \right)$ (B) $\sum_{n=1}^{\infty} (-1)^n \left(\frac{n^2}{2\sqrt{n}} \right)$ (C) $\sum_{n=1}^{\infty} (-1)^n \left(\frac{2\sqrt{n}}{n} \right)$ (D) $\sum_{n=1}^{\infty} (-1)^n \left(\frac{4-n}{n} \right)$

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2. What is the value of $\sum_{n=1}^{\infty} \frac{2^{n+1}}{7^n}$?

3. Which of the following series can be used with the Limit Comparison Test to determine whether the series $\sum_{n=1}^{\infty} \frac{2^n}{3^n - n^2}$ converges or diverges?

(A) $\sum_{n=1}^{\infty} \left(\frac{3}{2} \right)^n$ (B) $\sum_{n=1}^{\infty} \frac{1}{3^n}$ (C) $\sum_{n=1}^{\infty} \left(\frac{2}{3} \right)^n$ (D) $\sum_{n=1}^{\infty} \frac{1}{n}$

4. **Calculator active.** Find the sequence of partial sums $S_1, S_2, S_3, S_4,$ and S_5 for the infinite series $\sum_{n=1}^{\infty} \frac{3}{2^{n-1}}$.

5. Verify that the infinite series $\sum_{n=1}^{\infty} \frac{3^n + 1}{3^{n+2}}$ diverges by using the nth-Term Test for Divergence. Show the value of the limit.

6. Which of the following series converge?

    I. $\sum_{n=1}^{\infty} \frac{3^n}{n!}$ II. $\sum_{n=1}^{\infty} \frac{n}{8^n}$ III. $\sum_{n=1}^{\infty} \frac{2}{n\sqrt{n}}$

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

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7. For what values of x is the series $\sum_{n=1}^{\infty} \frac{(x + 2)^n}{n}$ conditionally convergent?

   (A) $x > -1$ (B) $x = -3$ (C) $x = -1$ (D) $x = 3$

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8. Use the Integral Test to determine the convergence or divergence of the series $\sum_{n=1}^{\infty} \frac{e^{\frac{1}{n}}}{n^2}$.

9. Which of the following series converge?

I. $\displaystyle\sum_{n=1}^{\infty} \frac{n^{-1}}{\sqrt{n}}$ II. $\displaystyle\sum_{n=1}^{\infty} \left(\frac{2}{3}\right)^n$ III. $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

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

10. Which of the following statements about the series $\displaystyle\sum_{n=1}^{\infty} \frac{3}{1+2^n}$ is true?

(A) Diverges by the nth Term test.

(B) Diverges by comparison to $\displaystyle\sum_{n=1}^{\infty} \frac{1}{2^n}$.

(C) Converges by comparison to $\displaystyle\sum_{n=1}^{\infty} \frac{1}{2^n}$.

(D) Diverges by comparison to $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$.

11. Which of the following statements about the series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}n}{n^2+3}$ is true?

(A) The series diverges by comparison with $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$.

(B) The series diverges by limit comparison with $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n}$.

(C) The series converges by comparison with $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2}$.

(D) The series converges by the Alternating Series Test.

12. Which of the following is required in order to apply the Integral Test to the series $\sum\limits_{n=1}^{\infty} a_n$?

(A) $\lim\limits_{n\to\infty} a_n = 0$ and $\sum\limits_{n=1}^{\infty} a_n$ is a positive series.

(B) $\lim\limits_{n\to\infty} a_n \neq 0$ and $\sum\limits_{n=1}^{\infty} a_n$ is a convergent series.

(C) $a_n = f(n)$ and $f(x)$ is positive, continuous, and increasing on $[1, \infty)$.

(D) $a_n = f(n)$ and $f(x)$ is positive, continuous, and decreasing on $[1, \infty)$.

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13. If $a_n > 0$ for all n and $\lim\limits_{n\to\infty} \frac{a_{n+1}}{a_n} = \frac{2}{3}$, which of the following series converges?

(A) $\sum\limits^{\infty} 3^n a_n$

(B) $\sum\limits^{\infty} \frac{2^n}{a_n}$

(C) $\sum\limits^{\infty} a_n \left(\frac{7}{2}\right)^n$

(D) $\sum\limits^{\infty} \frac{(a_n)^2}{3^n}$

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14. The infinite series $\sum\limits_{n=1}^{\infty} \frac{1}{7^{n+1}}$ has nth partial sum $S_n = \frac{1}{6}\left(\frac{1}{7} - \frac{1}{7^{n+1}}\right)$ for $n \geq 1$. What is the sum of the series?

15. For what value of r does the infinite series $\sum\limits_{n=0}^{\infty} 10r^n$ equal 22?

16. Determine whether the series $\displaystyle\sum_{n=1}^{\infty} \dfrac{\sin\left[\dfrac{(2n-1)\pi}{2}\right]}{n}$ converges absolutely, converges conditionally, or diverges.

17. Determine the convergence of the infinite p-series $\displaystyle\sum_{n=1}^{\infty} n^{-\pi}$.

18. The nth-Term Test can be used to determine divergence for which of the following series?

I. $\displaystyle\sum_{n=1}^{\infty} \dfrac{2}{n+1}$ II. $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1}\left(\dfrac{n}{4n+1}\right)$ III. $\displaystyle\sum_{n=1}^{\infty} \dfrac{n(n-2)^2}{3n^3+1}$

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