1) The sequence \( \left\{ \frac{n}{n+1} \right\} \) is
   a) A Cauchy sequence
   b) Not a Cauchy sequence
   c) Not a convergent sequence
   d) None of the above

Answer: a)

2) Which of the following statement is correct in the set of real numbers?
   a) Every Cauchy sequence is unbounded
   b) Every Cauchy sequence is divergent
   c) Every contractive sequence is not a Cauchy sequence
   d) Every Cauchy sequence is bounded

Answer: d)

3) The sequence \( \left\{ s_n \right\} \), where
   \[ s_n = \begin{cases} 2, & \text{when } n \text{ is even} \\ \text{lowest prime factor (≠ 1) of } n, & \text{when } n \text{ is odd} \end{cases} \]
   is a
   a) Convergent sequence
   b) Divergent sequence
   c) Cauchy sequence
   d) None of the above

Answer: b)

4) The sequence \( \left\{ \frac{3 + 2\sqrt{n}}{\sqrt{n}} \right\} \) is
   a) A Cauchy sequence
   b) Not a Cauchy sequence
   c) Not a convergent sequence
   d) None of the above

Answer: a)

5) The sequence of Fibonacci fractions \( x_n = \frac{f_n}{f_{n+1}} \), where \( f_1 = f_2 = 1 \) and \( f_{n+1} = f_n + f_{n-1} \) is
   a) Not a Cauchy sequence
   b) A divergent sequence
   c) A contractive sequence
   d) Not a contractive sequence

Answer: c)
6) The sequence \( \{ \ln(n) \} \) is
   a) A Cauchy sequence
   b) Not a Cauchy sequence
   c) A convergent sequence
   d) None of the above

Answer: b)

7) Which of the following is convergent series?
   a) \[ \sum_{n=1}^{\infty} \frac{\cos \frac{1}{n}}{n} \]
   b) \[ \sum_{n=1}^{\infty} \frac{1}{\sqrt{n}} \]
   c) \[ \sum_{n=1}^{\infty} \frac{\cos \frac{1}{n^2}}{n} \]
   d) None of the above

Answer: d)

8) The series \( \sum_{n=1}^{\infty} \frac{1}{n^p} \) converges if
   a) \( p = 1 \)
   b) \( p > 1 \)
   c) \( p < 1 \)
   d) \( p \leq 1 \)

Answer: b)

9) If a series \( \sum u_n \) of positive monotonic decreasing terms converges then
   a) \( u_n \downarrow \) \( 0 \)
   b) \( nu_n \to 0 \)
   c) \( nu_n \downarrow \) \( 0 \)
   d) None of the above

Answer: b)

10) The subsequence of the sequence \( \left\{ \sin \frac{1}{n} \right\} \) is
    a) \( \left\{ \sin \frac{1}{\ln(n)} \right\} \)
    b) \( \left\{ \sin \frac{1}{e^n} \right\} \)
    c) \( \left\{ \sin \frac{1}{\sqrt{n}} \right\} \)
    d) \( \left\{ \sin \frac{1}{n!} \right\} \)

Answer: d)