1. Given the sequence $\{a_n\} = \left\{2, \frac{3}{4}, \frac{4}{9}, \frac{5}{16}, \cdots\right\}$
   (a) Find the formula for the $n$-th term $a_n$
   (b) Find the limit of the sequence.
   (c) Is this a monotonic sequence?
   (d) Is this a bounded sequence?
2. Is the sequence given by $a_n = \dfrac{\ln n}{n}$ increasing or decreasing? Find the limit of the sequence.
3. Find the limit of the sequence
   (a) $a_n = \cos(\pi n)$
   (b) $a_n = \dfrac{5 - 2n - 3n^2}{6n^2 + n - 6}$
   (c) $a_n = \left(1 + \dfrac{3}{n}\right)^{2n}$
   (d) $a_n = \dfrac{4 + (-1)^n}{n}$
4. Find the limit of the sequence $\{a_n\}$ given recursively
   $$a_1 = 2, \qquad a_{n+1} = 1 - \frac{1}{a_n}$$
   if it converges.
5. Find the limit of the sequence $a_n = \dfrac{(-1)^n(n^2 + 2)}{3n^2 + 1}$ or show that it converges.
6. Find the third partial sum $s_3$ of the series $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{n}$.
7. The $n$-th partial sum of the series is $s_n = 3 - n2^{-n}$.
   (a) Find $a_n$
   (b) Find the sum of the series.
8. Find the $n$-th partial sum of the series $\displaystyle\sum_{n=1}^{\infty} \frac{3}{n^2 + n}$. Does the series converge? If yes, find the sum of the series?
9. Find the sum of the series $\displaystyle\sum_{n=3}^{\infty} 10\left(\frac{2}{5}\right)^{n-1}$.
10. Find the sum of the series $\displaystyle\sum_{n=0}^{\infty} \left[\frac{1}{5^n} + \left(\frac{2}{3}\right)^n\right]$.
11. Determine whether the series is convergent or divergent. If it converges, find its sum.
    (a) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{4 + e^{-n}}$

(b) $\sum_{n=0}^{\infty} \frac{2^n + 1}{e^n}$

(c) $\sum_{n=0}^{\infty} \frac{e^n}{n^3}$