1. Find a formula for the general term $a_n$ in the following sequences. Indicate whether you’re starting from $n = 1$ or $n = 0$; either choice is ok.

a) 2, 5, 8, 11, 14, …

b) $\frac{1}{2}$, $-\frac{1}{4}$, $\frac{1}{8}$, $-\frac{1}{16}$, $\frac{1}{32}$, …
2. Suppose that $a_1 = 2$, and for $n \geq 2$ we have $a_n = 3a_{n-1}$.

a) Write out the first five terms of the sequence.

b) Find an explicit formula for $a_n$. 

3. Evaluate the following limits:

a) \[ \lim_{n \to \infty} \frac{n^2 + 2n + 3}{3n^2 + 4n + 5} \]

b) \[ \lim_{n \to \infty} \frac{n}{|\ln n|^2} \]
4. Consider the series \(\frac{1}{2} - \frac{1}{4} + \frac{1}{8} - \frac{1}{16} + \frac{1}{32} - \cdots\).

a) Write it in sigma notation, that is, as \(\sum_{n=1}^{\infty} (\text{something})\) or \(\sum_{n=0}^{\infty} (\text{something})\).

b) Find the first three partial sums \(S_1, S_2, S_3\).

c) Does the series converge or diverge? If it converges, find the sum.
   Hint: It is a geometric series, although it doesn’t start from 1.
5. Consider the telescoping series $\sum_{n=1}^{\infty} (\sqrt{n} - \sqrt{n-1})$.

   a) Find the first three partial sums $S_1, S_2, S_3$.

   b) Give a formula for the $n^{th}$ partial sum $S_n$.

   c) Does the series converge or diverge? If it converges, find the sum.
6. Use the integral test to decide whether the following series converge or diverge.

a) \[ \sum_{n=1}^{\infty} \frac{1}{(2n+5)^2} \]

b) \[ \sum_{n=1}^{\infty} \frac{|\ln n|^n}{n} \]