1. Write the first five terms of the sequences.

\[ a_n = \frac{2^n}{n + 1} \]

\[ a_n = \frac{(-1)^n n}{n!} \quad \text{where } n! = 1 \cdot 2 \cdot 3 \cdots (n - 1) \cdot n. \]

\[ a_1 = 1, \ a_{n+1} = 5a_n - 3 \]

\[ a_1 = 1, \ a_2 = 1, \ a_n = a_{n-2} + n \cdot a_{n-1} \]
Determine whether the sequence is convergent or divergent. If it converges, find the limit.

2. \( a_n = \frac{1 + 3n + 2n^2}{-n + n^2} \)

3. \( a_n = 4 + \frac{5^n}{3^n} \)

4. \( a_n = \cos \left( \frac{n\pi}{n + 1} \right) \)
5. \(a_n = \frac{\sqrt{n^3 + n^2}}{n + 1}\)

6. \(a_n = \frac{(-1)^n n^2}{n + 2n^2}\)

7. \(a_n = \frac{\sin^2 n}{\ln(n + 1)}\) (Use the Squeeze Theorem)
8. Consider the sequence $a_n = \frac{1}{2n + 1}$.
   Show that this sequence is decreasing.

Show that this sequence is bounded.

9. Let $\{b_n\}_{n=1}^{\infty} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 1, 2, 3, 4, 5, 6, 7, 8, 9, \ldots\}$.
   Let $a_1 = 1$ and $a_{n+1} = a_n + \frac{b_n}{10^n}$. So $a_2 = 1 + \frac{1}{10} = 1.1$, $a_3 = 1.1 + \frac{2}{100} = 1.12$ and so on.
   Show that $\{a_n\}$ is increasing.

Show that $\{a_n\}$ is bounded.