Limits of Sequences

1. Consider the Fibonacci sequence

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, …

Use a calculator to find the decimal values of the ratios of successive terms, 1/1, 2/1, 3/2, 5/3, … and try to estimate the limiting value of this sequence.

2. By an infinite series like

\[ \frac{1}{1} + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \cdots \]

we really mean the limit of the sequence

\[ \frac{1}{1}, \frac{1}{1} + \frac{1}{3}, \frac{1}{1} + \frac{1}{3} + \frac{1}{9}, \cdots \]

What is the limit of this particular sequence?

3. Use a calculator to estimate the limit of the series

\[ \frac{4}{1} - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \cdots \]

4. By counting squares completely inside the circle, estimate the area of a circle of radius 1. The diagram shows grid lines with separation \( \frac{1}{5} \), \( \frac{1}{10} \), and \( \frac{1}{20} \).