

1. A Fibonacci sequence is defined recursively as  $f_1 = 1, f_2 = 1, f_n = f_{n-1} + f_{n-2}$ .
- Write out the first 7 terms of the sequence.
  - Now consider the sequence  $\{r_k\}$  where  $r_k = \frac{f_{k+1}}{f_k}$ . Write out the first 7 terms of this sequence.
  - Should  $r_n$  converge as  $n \rightarrow \infty$ ? If so, find the limit. If not, explain how you know.

2. Determine whether each series converges or not. Explain. For any series which does converge, find the sum.

(a)  $\sum_{n=2}^{\infty} \frac{1}{3^n}$

(b)  $\sum_{n=2}^{\infty} \frac{1}{3^{n+1}}$

(c)  $\sum_{n=1}^{\infty} \frac{3^n}{3^{n+4}}$

3. *An Alternating Series*

Read all three parts of this question before you do anything. Plan your exploration. You will need a calculator a graph board, and two different color pens.

- Explore the subsequence  $\left\{ \frac{(-1)^{k+1}}{k} \right\}_{k=1}^{10}$ . Use your calculator to get values you can plot on a graph-paper white board. Use one pen for all 10 points.
- Explore the series  $\sum_{k=1}^n \frac{(-1)^{k+1}}{k}$  for  $n$  taking on the integers values of 1 to 10. Use your calculator to get values you can plot on a graph-paper white board. Use the other color pen for these 10 points.
- Will either sequence converge?