1. Does the series $1 + 1 + 1 + \cdots$ converge or diverge? If it converges, what is its sum?

2. Does the series $1 + (-1) + 1 + (-1) + \cdots$ converge or diverge? If it converges, what is its sum?

3.   (a) Does the series $1 + \dfrac{1}{2} + \dfrac{1}{4} + \dfrac{1}{8} + \cdots$ converge or diverge? If it converges, what is its sum?

(b) Draw a diagram showing the first 6 partial sums of the series $1 + \dfrac{1}{2} + \dfrac{1}{4} + \dfrac{1}{8} + \cdots$.

4. In this problem, you'll investigate the series $\displaystyle\sum_{k=1}^{\infty} \dfrac{2}{(2k)^2 - 1}$.

(a) Write out the first 4 terms of the series.

(b) Find the first 4 partial sums of the series. Express them as simplified fractions.

(c) Looking at your answer to 4b, guess a formula for the n-th partial sum.

(d) Based on your guess from part (c), does the series converge or diverge? If it converges, what is its sum?

5. (a) Draw a partial sum diagram showing the first 6 partial sums of the series $\displaystyle\sum_{k=0}^{\infty}\left(-\frac{1}{2}\right)^{k}$.

 (b) Based on your diagram, do you think the series $\displaystyle\sum_{k=0}^{\infty}\left(-\frac{1}{2}\right)^{k}$ converges or diverges?

6. Here is a diagram showing the first 6 partial sums of an unknown series $\displaystyle\sum_{k=1}^{\infty}a_{k}$.
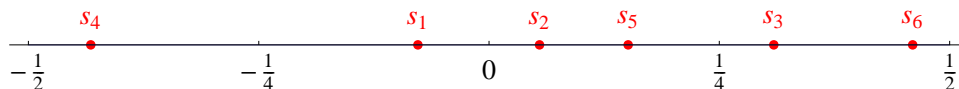
 (a) From the diagram, determine whether each of $a_1, a_2, \ldots, a_6$ is positive, negative, or zero.

 (b) Which of $a_1, a_2, \ldots, a_6$ is biggest in magnitude?