Section 9.2 Geometric Series (Part 1)

Geometric Series

P 1. It is not always obvious that a series is a geometric series. Write the series $5 - 10 + 20 - 40 + 80 + \cdots$ in the form $a + ax + ax^2 + ax^3 + \cdots$.

P 2. Compute the sum of the finite geometric series $2(0.1)^5 + 2(0.1)^6 + \cdots + 2(0.1)^{13}$.

> **Theorem**
>
> The sum of the infinite geometric series
>
> $$S = a + ax + ax^2 + \cdots$$
>
> is $\frac{a}{1-x}$ if $|x| < 1$.

P 3. Compute $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} + \cdots$.

P 4. Find the value of the following geometric sequence.

$$\frac{3}{2} - \frac{1}{2} + \frac{1}{6} - \frac{1}{18} + \frac{1}{54} + \cdots .$$

P 5. If $S = a + ax + ax^2 + ax^3 + \cdots$ is a infinite geometric series which is equal to 8 can $a = 1$?

P 6. We have a way of determining the value of a infinite geometric series when $|x| < 1$. Let $x = 1$. What can be said about $a + ax + ax^2 + ax^3 + \cdots$? What about when $x = -1$?

P 7. Determine the sum of the series

$$S = 2 + 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots .$$