

Think It Through

October 12

1. Consider the geometric series $\sum_{n=1}^{\infty} ar^{n-1}$. For what values of r does the series converge?
2. For each of the following series determine if they converge to a finite number. If they do converge determine the number.

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

(b) $\sum_{n=1}^{\infty} \left(\frac{1}{3}\right)^n$

(c) $\sum_{n=1}^{\infty} 5 \left(\frac{1}{5}\right)^{n-1}$

(d) $\sum_{n=1}^{\infty} (-1)^n$

3. Determine the value of

$$\sum_{n=1}^{\infty} (2^{n+1} - 1) \left(\frac{1}{9}\right)^n$$

4. Determine the value of

$$\sum_{n=1}^{\infty} 63^{n-1} \left(\frac{1}{8}\right)^{2n}$$

5. Determine the value of

$$\sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^n \left(\frac{5}{4}\right)^{2n}$$

6. Determine the value of

$$\sum_{n=1}^{\infty} (3^{n+1} - 1) \left(\frac{1}{8}\right)^n$$

7. Determine values of x so that the following series converges

$$\sum_{n=1}^{\infty} \frac{2^n}{2^x}$$

8. ★ Show that the series $\sum_{n=1}^{\infty} \frac{1}{n}$ is divergent.