

**Problems for Gateway #1: Evaluating the Sum of a Finite Geometric Series**

1. The sum of the series:  $1 + 2 + 4 + 8 + \dots + 2^n + \dots + 256$  is equal to
- (a) 512
  - (b) 1024
  - (c)  $2^9 - 1$
  - (d) It is impossible to evaluate the sum as the series does not converge.
2. The sum of the series:  $3 + 1 + \frac{1}{3} + \dots + \frac{3}{3^n} + \dots + \frac{1}{27}$  is equal to
- (a) 1089
  - (b)  $\frac{3 \cdot \left[1 - \left(\frac{1}{3}\right)^5\right]}{1 - \left(\frac{1}{3}\right)}$
  - (c)  $\frac{3 \cdot \left[1 - \left(\frac{1}{3}\right)^3\right]}{1 - \left(\frac{1}{3}\right)}$
  - (d) It is impossible to evaluate the sum as the series does not converge.
3. The sum of the series:  $0.9 + (0.9)^2 + \dots + (0.9)^n + \dots + (0.9)^{100}$  is equal to
- (a)  $\frac{0.9 \cdot \left[1 - (0.9)^{100}\right]}{1 - 0.9}$
  - (b)  $\frac{\left[1 - (0.9)^{100}\right]}{1 - 0.9}$
  - (c)  $\frac{0.9}{1 - 0.9}$
  - (d) It is impossible to evaluate the sum as the series does not converge.

4. The sum of the series:  $1 + \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^4 + \dots + \left(\frac{1}{2}\right)^n + \dots + \left(\frac{1}{2}\right)^{100}$  is equal to

(a)  $\frac{\left[1 - \left(\frac{1}{2}\right)^{101}\right]}{1 - \frac{1}{2}}$

(b)  $\frac{\left(\frac{1}{2}\right) \cdot \left[1 - \left(\frac{1}{2}\right)^{101}\right]}{1 - \frac{1}{2}}$

(c)  $\frac{\left[1 - \left(\frac{1}{2}\right)^{51}\right]}{1 - \left(\frac{1}{2}\right)^2}$

(d) It is impossible to evaluate the sum as the series does not converge.

5. The sum of the series:  $9 + 27 + \dots + 3^{n+1} + \dots + 243$  is equal to

(a) 360

(b)  $\frac{9 \cdot \left[1 - 3^{17}\right]}{1 - 3}$

(c)  $\frac{9 \cdot \left[1 - 3^{16}\right]}{1 - 3}$

(d) It is impossible to evaluate the sum as the series does not converge.

6. The sum of the series:  $1 - 1 + 1 + \dots + (-1)^n + \dots + (-1)^{100000}$  is equal to

(a) 1

(b) 0

(c) -1

(d) It is impossible to evaluate the sum with the information given.

7. The sum of the series:  $3 + 9 + \dots + 3^n + \dots + 3^{22}$  is equal to

(a)  $\frac{3 \cdot [1 - 3^{21}]}{1 - 3}$ .

(b)  $\frac{[1 - 3^{23}]}{1 - 3}$

(c)  $\frac{3 \cdot [1 - 3^{22}]}{1 - 3}$

(d) It is impossible to evaluate the sum as the series does not converge.

8. The sum of the series:  $1 + 7 + 49 + \dots + 7^n + \dots + 7^{100}$  is equal to

(a)  $\frac{[1 - 7^{101}]}{1 - 7}$

(b)  $7 \cdot \frac{[1 - 7^{101}]}{1 - 7}$

(c)  $\frac{[1 - 7^{100}]}{1 - 7}$

(d) It is impossible to evaluate the sum as the series does not converge.

9. The sum of the series:  $1 + \frac{1}{8} + \frac{1}{8^2} + \dots + \dots + \frac{1}{8^{100}}$  is equal to

(a)  $\frac{8 \cdot [1 - (\frac{1}{8})^{101}]}{1 - \frac{1}{8}}$

(b)  $\frac{(\frac{1}{8}) \cdot [1 - (\frac{1}{8})^{101}]}{1 - \frac{1}{8}}$

(c)  $\frac{[1 - (\frac{1}{8})^{102}]}{1 - (\frac{1}{8})}$

(d)  $\frac{[1 - (\frac{1}{8})^{101}]}{1 - (\frac{1}{8})}$

10. The sum of the series:  $1.728 + \dots + (1.2)^{3n} + \dots + (1.2)^{30}$  is equal to

(a) 36

(b)  $\frac{1.728 \cdot [1 - 1.728^{10}]}{1 - 1.728}$

(c)  $\frac{[1 - 1.728^{10}]}{1 - 1.728}$

(d)  $\frac{1.728 \cdot [1 - 1.2^{10}]}{1 - 1.2}$

**Answers**

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|----|---|----|---|----|---|-----|---|----|---|----|---|
| 1. | C | 2. | B | 3. | A | 4.  | C | 5. | A | 6. | B |
| 7. | C | 8. | A | 9. | D | 10. | B |    |   |    |   |