

Calculus BC – Sum of an infinite Geometric Series

Find the sum of the following or state that the series diverges.

1. $\sum_{n=0}^{\infty} \left(\frac{2}{3}\right)^n$

6. $\sum_{n=3}^{\infty} \frac{3^n}{11^n}$

11. $\sum_{n=0}^{\infty} \frac{7 \cdot 3^n}{5^n}$

2. $\sum_{n=0}^{\infty} \left(-\frac{2}{\pi}\right)^n$

7. $1 + \frac{2}{7} + \frac{2^2}{7^2} + \frac{2^3}{7^3} + \dots$

12. $\sum_{n=0}^{\infty} \frac{8 + 2^n}{5^n}$

3. $\sum_{n=0}^{\infty} \left(\frac{4}{3}\right)^n$

8. $\sum_{n=2}^{\infty} e^{3-2n}$

13. $\sum_{n=3}^{\infty} 2\left(-\frac{3}{4}\right)^n$

4. $\frac{1}{3^3} + \frac{1}{3^4} + \frac{1}{3^5} + \dots$

9. $\sum_{n=0}^{\infty} \frac{93^n + 4^{n-2}}{5^n}$

14. $\sum_0^{\infty} e^{-n}$

5. $\sum_{n=0}^{\infty} \left(\frac{e}{2}\right)^n$

10. $\frac{64}{49} + \frac{8}{7} + 1 + \frac{7}{8} + \dots$

15. Which of the following are NOT geometric series?

a) $\sum_{n=0}^{\infty} \frac{(-7)^n}{29^n}$

b) $\sum_{n=0}^{\infty} \frac{1}{n^4}$

c) $\sum_{n=0}^{\infty} \frac{n^2}{2^n}$

d) $\sum_{n=0}^{\infty} \pi^{-n}$

16. Which of the following series are divergent?

a) $\sum_{n=0}^{\infty} \frac{(-2)^n}{5^n}$

b) $\sum_{n=0}^{\infty} 1.5^n$

c) $\sum_{n=0}^{\infty} \frac{(-5)^n}{2^n}$

d) $\sum_{n=0}^{\infty} 0.5^n$

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Answers.

1. 3
2. $\frac{\pi}{\pi + 2}$
3. Diverges
4. $1/18$
5. Diverges
6. $27/968$
7. $7/5$
8. $\frac{e}{e^2 - 1}$
9. Diverges
10. $512/49$
11. $35/2$
12. $35/3$
13. $-27/56$
14. $\frac{e}{e - 1}$
15. B & C
16. B & C