

Sum Formulas:

$S_n = \frac{n}{2}(a_1 + a_n)$	$S_n = a_1 \left( \frac{1 - r^n}{1 - r} \right)$	$S_n = \frac{n(n+1)(2n+1)}{6}$	$S_n = \left[ \frac{n(n+1)}{2} \right]^2$
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Determine the sum of the following series. Write out all the terms or use a formula.

1.  $\sum_{k=1}^{15} k^2 (k-1) =$

2.  $\sum_{k=10}^{20} k^3 =$

3.  $\sum_{k=-2}^2 (-1)^k \cdot 2^k =$

4.  $\sum_{n=1}^{1000} 5 =$

5.  $\sum_{n=1}^7 5^n =$

6.  $\sum_{n=1}^{14} 2n - 1 =$

Express the repeating decimal as a fraction using geometric series. (SHOW WORK)

7.  $3.\overline{42} \dots$

8.  $\overline{.8} \dots$

Determine whether the series converges or diverges (using the specified test). (SHOW WORK)  
If the Geometric series converges then find the sum.

9.  $\sum_{k=1}^{\infty} \left( \frac{2}{3} \right)^k$  (Geometric Series Test)

10.  $\sum_{k=1}^{\infty} \frac{3}{-7^k}$  (Geometric Series Test)

11.  $\sum_{k=1}^{\infty} (-1)^{k+1}$  (*Geometric Series Test*)

12.  $\sum_{k=1}^{\infty} \frac{3k^2}{k^2+1}$  (*Divergence Test*)

13.  $\sum_{k=1}^{\infty} \frac{k+1}{k+2}$  (*Divergence Test*)

14.  $\sum_{k=1}^{\infty} \frac{e^k}{k^3}$  (*Divergence Test*)

15.  $\sum_{k=1}^{\infty} \frac{k}{k^2+1}$  (*Integral Test*)

16.  $\sum_{k=1}^{\infty} \frac{\ln k}{k}$  (*Integral Test*)

17.  $\sum_{k=1}^{\infty} k^2 e^{-k^3}$  (*Integral Test*)

18.  $\sum_{k=1}^{\infty} \frac{1}{k^{4/5}}$  (*P-Series Test*)

19.  $\sum_{k=1}^{\infty} k^{-5}$  (*P-Series Test*)

20.  $\sum_{k=1}^{\infty} \frac{1}{\sqrt[3]{k}}$  (*P-Series Test*)

21.  $\sum_{k=1}^{\infty} \frac{4^k}{k!}$  (*Ratio Test*)

22.  $\sum_{k=1}^{\infty} \frac{k}{2^k}$  (*Ratio Test*)

23. Find the sum of the infinite geometric series  $-7 - \frac{7}{3} - \frac{7}{9} - \frac{7}{27} - \dots$

24. Which of the following series is harmonic?

A.  $\sum_{n=1}^{\infty} \frac{1}{n}$     B.  $\sum_{n=1}^{\infty} \frac{1}{2n(2n+1)}$     C.  $\sum_{n=1}^{\infty} \frac{1}{n+2}$     D.  $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$     E. None of these.

25. Which test could be used to prove the divergence of  $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ ?

26. Which test could be used to prove the divergence of  $\sum_{n=1}^{\infty} \frac{n+1}{3n+1}$ ?