

Determine whether the sequence converges or diverges. If it converges, find the limit and give an explanation.

1.  $a_n = n(n - 3)$

2.  $a_n = \frac{1+2n^3}{n-n^3}$

3.  $a_n = \frac{1}{2n^3+2}$

4.  $a_n = \frac{1+2n^3}{n-n^2}$

5.  $a_n = \ln \frac{n}{n+1}$

6.  $a_n = \frac{(n+3)!}{n!}$

7.  $a_n = \frac{3^n}{2^{n+1}}$

8.  $a_n = \frac{-5}{4^n}$

9.  $a_n = \frac{(-1)^n}{2^{n+1}}$

10.  $a_n = \frac{(-1)^n n}{n^2-3}$

11.  $a_n = \frac{3^n}{2n}$

12.  $a_n = \arctan(3n)$

13.  $a_n = \frac{\sin^2 n}{2n}$

14.  $a_n = n \sin n$

15.  $a_n = \sin\left(\frac{3}{n}\right)$

16.  $a_n = \frac{\ln n}{n^3}$

Determine whether the following series converge absolutely, converge conditionally, or diverge. Specify all the tests that could be used. Show the proof for a test of your choice. Also find the sum of convergent geometric and telescoping series.

	Abs/Cond Conv , Div	Applicable Test or Tests	Show proof using one convergence test. Find sum of convergent geometric/telescoping series
1	$\sum_{n=1}^{\infty} n(n-3)$		
2	$\sum_{n=2}^{\infty} \frac{1+2n^3}{n-n^3}$		
3	$\sum_{n=1}^{\infty} \frac{1}{2n^3+3}$		
4	$\sum_{n=1}^{\infty} \ln \frac{n}{n+1}$		
5	$\sum_{n=1}^{\infty} \frac{\sin(2n)}{3^n}$		

6	$\sum_{n=1}^{\infty} \frac{(n+3)!}{n!}$		
7	$\sum_{n=1}^{\infty} \frac{3^n}{2^{n+1}}$		
8	$\sum_{n=1}^{\infty} \frac{(-1)^n}{2^{n+1}}$		
9	$\sum_{n=1}^{\infty} \frac{-5}{4^n}$		
10	$\sum_{n=2}^{\infty} \frac{3}{n^2 - n}$		
11	$\sum_{n=1}^{\infty} \frac{2 - 3^n}{5^n}$		

12	$\sum_{n=1}^{\infty} \arctan(3n)$		
13	$\sum_{n=2}^{\infty} \frac{1}{2n^3 - 3}$		
14	$\sum_{n=1}^{\infty} \frac{1}{2n + 3}$		
15	$\sum_{n=2}^{\infty} \frac{1}{2n - 3}$		
16	$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n} + 2}$		
17	$\sum_{n=5}^{\infty} \frac{1}{\sqrt{n} - 2}$		

18	$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n+2}}$		
19	$\sum_{n=3}^{\infty} \frac{(-1)^n}{\sqrt{n-2}}$		
20	$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2+2}}$		
21	$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^3+2}}$		
22	$\sum_{n=1}^{\infty} ne^{-n^2}$		
23	$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^3+1}$		

24	$\sum_{n=1}^{\infty} \frac{(-1)^n n^3}{n^3 + 1}$		
25	$\sum_{n=1}^{\infty} \frac{(-2)^n}{n^5}$		
26	$\sum_{n=1}^{\infty} \frac{n^5}{(-2)^n}$		
27	$\sum_{n=1}^{\infty} \frac{(-1)^n n^2}{n^3 + 1}$		
28	$\sum_{n=1}^{\infty} \frac{(-7)^n}{n!}$		
29	$\sum_{n=1}^{\infty} \frac{n!}{5^n}$		