

Developing your intuition: For each of the following series, guess if it diverges, converges conditionally or converges absolutely. Keep in mind that you must answer two separate questions: 1. Does the series converge? and 2. Does the series converge absolutely? Name the test(s) you would use to answer each of these questions. Usually you are required to give a detailed solution, but for this worksheet, just briefly describe your overall strategy.

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

6.
$$\sum_{n=1}^{\infty} \frac{\cos^2 n}{n^{3/2}}$$

2.
$$\sum_{n=1}^{\infty} \frac{(-1)^n n}{e^n}$$

7.
$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^3 + n}$$

3.
$$\sum_{n=1}^{\infty} \frac{2^n}{n!}$$

8.
$$\sum_{n=2}^{\infty} \frac{(-1)^n \arctan n}{\sqrt{n}}$$

4.
$$\sum_{n=1}^{\infty} \frac{(\sin n) 2^n}{n!}$$

9.
$$\sum_{n=1}^{\infty} \frac{(-1)^n \ln n}{n^2}$$

5.
$$\sum_{n=2}^{\infty} \frac{(-1)^n (n^3 + 1)}{n^4 + n - 4}$$

10.
$$\sum_{n=2}^{\infty} \frac{(-1)^n n}{(\ln n)^2}$$

11.
$$\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n^7 + n}}{\sqrt{n^9 + n^5}}$$

16.
$$\sum_{n=1}^{\infty} \frac{2 - 5^n}{11^{n-1}(-1)^n}$$

12.
$$\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{n^7 + n}}{\sqrt{n^{10} + n^5}}$$

17.
$$\sum_{n=1}^{\infty} \sqrt{n} 2^{n+1}$$

18.
$$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{4n^5 + n^4 - 1}}$$

13.
$$\sum_{n=1}^{\infty} \frac{(-1)^n 10n^2}{n^4 + 1}$$

19.
$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{3^n n!}{1 \cdot 3 \cdot 5 \cdot 7 \dots (2n - 1)}$$

14.
$$\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}}$$

20.
$$\sum_{n=1}^{\infty} \frac{(-1)^n \sin(n^3)}{2^n}$$

15.
$$\sum_{n=1}^{\infty} \frac{n(-2)^n}{n!}$$

21.
$$\sum_{n=1}^{\infty} \frac{(-1)^n n!}{e^{n^2}}$$