

For each series, determine the following:

- Does the series converge conditionally or converge absolutely?
- Calculate S_{1000} .
- How close does this approximate the value of the series?

1.
$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^5}{n^6 + 17}$$

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

3.
$$\sum_{k=1}^{\infty} \frac{\cos(k)}{k^4 + 1}$$
 (Notice that this isn't an alternating series!)