# Series — Alternating

Name: _____ Date: _____

Does each series converge absolutely, converge conditionally, or diverge?

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

$\sum |a_n| = \sum \frac{3}{n}$ : $p = 1 \leq 1$, diverges

$b_n = \frac{3}{n}$ decreases, and $\lim_{n \to \infty} b_n = 0$

Alternating series test: converges

The series converges conditionally

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

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

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

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

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

# Series · Alternating — Answer key

1. $\infty\sum n = 1(-1)^{n+1}\frac{3}{n}$ → converges conditionally

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

3. $\infty\sum n = 1(-1)^{n+1}\frac{n}{n+3}$ → diverges

4. $\infty\sum n = 1(-1)^{n+1}\frac{2}{n\sqrt{n}}$ → converges absolutely

5. $\infty\sum n = 1(-1)^{n+1}\frac{2}{n^2\sqrt{n}}$ → converges absolutely

6. $\infty\sum n = 1(-1)^{n+1}\frac{1}{\sqrt{n}}$ → converges conditionally