ALTERNATING SERIES

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Name: _____

Theorem. *Let $\{b_n\}$ be a sequence with positive terms, $0 < b_n$. If there exists some N such that*

(1) $b_{n+1} \leq b_n$ whenever $n \leq N$ and

(2) $\lim_{n\to\infty} b_n = 0$

then the Alternating Series

$$\sum_{n=1}^{\infty}(-1)^{n-1}b_n$$

converges.

Decide whether the following series converge or diverge.

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

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

3. $\displaystyle\sum_{n=1}^{\infty}(-1)^n \sin\left(\frac{\pi}{n}\right)$

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

5. For what values of p is the series

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^p}$$

convergent?

6. Approximate the sum of the series

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

correct to four decimal places.