Worksheet #42: Alternating Series Test and The Ratio Test for Absolute Convergence

Basic Guidelines:

1. The Alternating Series Test for either form $\sum_{k=1}^{\infty}(-1)^{k+1}a_k$ or $\sum_{k=1}^{\infty}(-1)^{k}a_k$ is:

If (a) $a_k \geq a_{k+1}$ and (b) $\lim_{k\to\infty} a_k = 0$, then the alternating series converges. (If $\lim_{k->\infty} a_k \neq 0$, then the series diverges.)

2. The Ratio Test for Absolute Convergence: If $\rho = \lim_{k\to\infty}\frac{|u_{k+1}|}{|u_k|} < 1$, then the series $\sum_{k=1}^{\infty} u_k$ converges absolutely. If $\rho > 1$, then the series diverges.

1. Determine whether the following alternating series converge or diverge by the alternating series test:

(a) $\sum_{k=1}^{\infty}(-1)^{k+1}\frac{k}{5k+1}$

(b) $\sum_{k=1}^{\infty}(-1)^{k}e^{-2k+1}$

2. Use the ratio test for absolute convergence to determine whether the series converges or diverges:

(a) $\sum_{k=1}^{\infty}(-1)^{k}\frac{7^k}{k^3}$

(b) $\sum_{k=1}^{\infty}(-1)^{k}\frac{3^k}{k!}$