

## HW 19: Section 8.4 and 8.5

Due: Thursday, November 21st in SQRC by 9pm

**Learning Goals:**

- Use the alternating series test
- Understand the difference between conditional convergence and absolute convergence
- Use the ratio test to determine convergence
- Estimate the value that a convergent series converges to

**Questions:**

1. If  $a_k \geq 0$  and  $\lim_{k \rightarrow \infty} a_k = 0$ , explain in terms of partial sums why  $\sum_{k=1}^{\infty} (-1)^{k+1} a_k$  is more likely to converge than  $\sum_{k=1}^{\infty} a_k$ .
2. Problem 8.4.4 Determine whether the series  $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{k^2}{k+1}$  converges or diverges.
3. Problem 8.4.16 Determine whether the series  $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{k!}{3^k}$  converges or diverges.
4. Problem 8.4.22 Determine whether the series  $\sum_{k=1}^{\infty} (-1)^k \frac{1}{\ln(k)}$  converges or diverges.
5. Problem 8.5.8 Determine whether the series  $\sum_{k=4}^{\infty} (-1)^k \frac{10^k}{k!}$  is absolutely convergent, conditionally convergent, or divergent.
6. Problem 8.5.10 Determine whether the series  $\sum_{k=3}^{\infty} (-1)^{k+1} \frac{4}{2k+1}$  is absolutely convergent, conditionally convergent, or divergent.
7. Problem 8.5.16 Determine whether the series  $\sum_{k=1}^{\infty} \frac{4}{k}$  is absolutely convergent, conditionally convergent, or divergent.
8. How many terms must you sum in order for the error between the partial sums and  $\sum_{k=1}^{\infty} (-1)^{k+1} \frac{1}{k}$  to be less than  $\frac{1}{1000}$ ?
9. How many terms must you sum in order for the error between the partial sums and  $\sum_{k=1}^{\infty} \frac{1}{k^2}$  to be less than  $\frac{1}{1000}$ ?