

# Math 1B Discussion Section Problems

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You should work on the following problems in groups of 3 or 4. Try to get through as many as you can, but you aren't expected to finish everything. Instead, you should make sure everyone in your group knows **how** to solve all the problems and not just the answers.

1. Determine whether each of the following series is absolutely convergent, conditionally convergent, or diverges:

(a)  $\sum_{n=1}^{\infty} \frac{2^n}{n!}$

(b)  $\sum_{n=1}^{\infty} \frac{n3^n}{5^{n-1}}$

(c)  $\sum_{n=1}^{\infty} \frac{(n^4 + 1)2^{2n}}{5^{n+3}}$

(d)  $\sum_{n=1}^{\infty} \frac{\sin(4n)}{n^2}$

(e)  $\sum_{n=1}^{\infty} \frac{n!}{n^n}$

2. For what values of  $p$  does  $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^p}$  converge (a) absolutely, (b) conditionally?

3. We know that the ratio test gives us no information if  $\lim \left| \frac{a_{n+1}}{a_n} \right| = 1$ .

- (a) Prove this by giving an example that converges and one that diverges.
- (b) Does this mean all hope is lost in determining convergence/divergence?