

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1. Do #65b in §11.2.
2. Theorem 11.2.8 gives some useful results about sums, differences, and constant multiples of convergent series. Many people would expect that the sum or difference of divergent series would have to diverge as well. Demonstrate that this is not the case.

3. [Anton] We discovered in class that  $\ln 2 = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \dots$ . Show that we can

rearrange the order of the terms in this series so that its sum is  $\frac{1}{2} \ln 2$  by rewriting it as

$$\left(1 - \frac{1}{2} - \frac{1}{4}\right) + \left(\frac{1}{3} - \frac{1}{6} - \frac{1}{8}\right) + \left(\frac{1}{5} - \frac{1}{10} - \frac{1}{12}\right) + \dots \quad [\text{Hint: Add the first two terms in each set of parentheses}].$$

4. a) Find  $\sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^n$ .

- b) Find  $\sum_{n=0}^{\infty} \left(\frac{2}{5}\right)^n$ .

- c) Find  $\sum_{n=0}^{\infty} \left(\frac{5}{3}\right)^n$ .

- d) Find  $\sum_{n=0}^{\infty} x^n$ .