

**Math 153-37, Mr. Church, Homework 8**

Due at the beginning of class on Friday, February 6.

Please staple your homework.

1. Exercise 12.1.10.

2. (a) Show that

$$\sum_{k=2}^6 \frac{k}{k^2 + 1} \quad \text{and} \quad \sum_{n=-1}^3 \frac{n + 3}{n^2 + 6n + 10}$$

are equal by expanding each into an explicit sum of numbers<sup>1</sup> and observing that the sums are equal.

(b) Now note that we can get the second fraction from the first by replacing  $k$  by  $n + 3$ . Explain as best you can in one or two sentences why we *subtract* 3 from the limits.

(c) Fill in the question marks:

$$\sum_{k=7}^{10} k^2 e^k = \sum_{n=?}^? (n - 2)^2 e^{n-2}$$

3. Show that  $\sum_{k=3}^{\infty} \frac{k}{k+1}$  diverges.

4. (due next Wednesday as part of HW9) Exercise 12.1.26 (challenging).

5. (due next Wednesday as part of HW9) Exercise 12.2.12.

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<sup>1</sup>like, for example, expanding  $\sum_{i=2}^5 i^2$  as  $4 + 9 + 16 + 25$