Math 2141 — Fall, 2008

Take Home Midterm Exam

Instructions: Do all problems. Show your work or I can’t give you any credit. Some problems will come from the text, others will be stated below.

1. Let $P$ be the statement: Every rule has an exception. Is it a mathematical statement? Explain your answer. Is it true? Can it be true?

2. Use induction to show that, for all $n \in \mathbb{N}$,
   \[
   \frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \cdots + \frac{1}{n \cdot (n+1)} = \frac{n}{n+1}.
   \]

3. Problem 1.1 — 19. From here on, this means Problem x (=19 here) of Section y.z (= 1.1 here) in the text.

4. Problem 1.2 — 6 (You might try using Dedekind cuts to prove this.)

5. Problem 2.1 — 11.

6. Problem 2.3 — 8.

7. Problem 2.3 — 10.