

In-class, Week 4, day 1

Section 2.3, Problem 74: Prove or disprove each of the following statements about floor and ceiling functions.

a. $\lceil \lfloor x \rfloor \rceil = \lfloor x \rfloor$

b. $\lfloor x + y \rfloor = \lfloor x \rfloor + \lfloor y \rfloor$ for all real numbers x and y .

c. $\lceil \lceil \frac{x}{2} \rceil / 2 \rceil = \lceil \frac{x}{4} \rceil$ for all real numbers x .

d. $\lfloor \sqrt{\lceil x \rceil} \rfloor = \lfloor \sqrt{x} \rfloor$ for all positive real numbers x .

e. $\lfloor x \rfloor + \lfloor y \rfloor + \lfloor x + y \rfloor \leq \lfloor 2x \rfloor + \lfloor 2y \rfloor$ for all real numbers x and y .

Section 2.4, Problem 36: Use the identity $1/(k(k+1)) = 1/k - 1/(k+1)$ and Exercise 35 to compute $\sum_{k=1}^n 1/(k(k+1))$.