

## Proofs involving real numbers

- Read carefully pages 105 through 108 (section 4.3)
- Some key questions to answer (try these without looking at the book, but after you've read the book):
  1. True or False:  $ab > 0$  exactly when  $a, b$  are both negative or both positive.
  2. Prove that the product  $xy$  is equal to 0 if and only if  $x = 0$  or  $y = 0$ .
  3. Prove that for all real numbers  $x, y$  we have  $\frac{1}{3}x^2 + \frac{3}{4}y^2 \geq xy$ .
  4. State and prove the triangle inequality.
  5. Prove that if for a real number  $x$  and for  $r > 0$  we have  $|x - 1| < 1$  and  $|x - 1| < r/4$ , then it must be that  $|x^2 + x - 2| < r$ .
  6. True or False: If  $|x - 1| < 1$  then:
    - $|x - 1| < 2$
    - $|x - 1| < 0.5$
    - $|x - 0.5| < 1$
    - $|x - 0.5| < 0.5$
    - $|x| < 1$
- Practice problems from section 4.3 (page 115): 4.25, 4.29, 4.31, 4.35, 4.39