

Assignment 3
Due: October 18, 9:30 am

1. (2 points) Prove or disprove that if a and b are rational numbers, then a^b is also rational.
2. (4 points) Prove that $\sqrt[3]{2}$ is irrational. [Hint: similar to the proof of " $\sqrt{2}$ is irrational"]
3. (4 points) Prove $|x-y| \leq |x| + |y|$ for all real numbers x and y (where $|x|$ represents the absolute value of x , which equals x if $x \geq 0$ and equals $-x$ if $x < 0$). [Hint: you may do proof by cases. Similar to exercise 5 of Sec1.7]
4. (6 points) Given a set $A = \{\{5\}, \emptyset, a\}$
 - a. Is 5 a member of A ?
 - b. Is $\{5\}$ a member of A ?
 - c. What is the cardinality (size) of A ?
 - d. Is $\{5\}$ a subset of A ?
 - e. What is the powerset of A ?
 - f. What is the Cartesian product of A and $\{99\}$, i.e. $A \times \{99\}$?