University of Bahrain Department of Mathematics MATHS253: Set Theory Fall 2018 Dr. Abdulla Eid



Homework 6: Proof by contradiction Due Date: November 15, 2018

Name: _____

1. Prove there is no largest real number.

2. Prove that the product of irrational number and nonzero rational number is irrational.

MATHS 253 Homework 6: Proof by contradiction, Page 2 of 4

3. Prove that if *x* and *y* are positive real number, then $\sqrt{x+y} \neq \sqrt{x} + \sqrt{y}$.

4. Disprove that if *x* and *y* are positive real number, then $\ln(x \cdot y) = \ln(x) \cdot \ln(y)$

5. Prove that at least one of the real numbers a_1, a_2, \ldots, a_n is greater than or equal to the average of these numbers.

6. *

(a) $3 \mid x$ if and only if $3 \mid x^2$.

(b) $\sqrt{3}$ is irrational number.

(c) Can you generalize your argument in (a) and (b) to prove that \sqrt{D} is irrational for any square free *D*.