

Course: CS 1050 D (Spring'06) – Homework 2

Instructor : Prasad Tetali, office: Skiles 234, email: tetali@math.gatech.edu
Office Hours: Mon. Wed. Fri. 2:00–3:00pm

Due: Friday, Jan. 27th

Problem 1. For what conditions on sets A and B does $A \setminus B = B \setminus A$ hold?

Problem 2. Write the negation of the statement “No slow learners attend this school,” in English and then using a quantifier.

Problem 3. A closet contains n different pairs of shoes. Determine the minimum t such that every choice of t shoes from the closet includes at least one matching pair of shoes. For $n > 1$, what is the minimum t to guarantee that two matching pairs of shoes are obtained?

Problem 4. Suppose I have a penny, a dime, and a dollar, and I say: “If you make a true statement, I will give you one of the coins. If you make a false statement, I will give you nothing.” What should you say to obtain the best coin?

• Recall the *Arithmetic Geometric Mean (AGM) inequality*: If x and y are nonnegative reals, then $\sqrt{xy} \leq (x + y)/2$; more over, equality is achieved only when $x = y$.

Problem 5. (a) Use the AGM inequality to prove that $x(c - x)$ is maximized when $x = c/2$.

(b) For $a > 0$, use part (a) to find the value of y maximizing $y(c - ay)$.

Remaining Problems:

From Review Exercises for Chapter 0: (on Page 18): 12, 15

Section 2.2: Problems 13 (c,d), 15, 20, 30 (b, e)