

COMPUTER SCIENCE 20, SPRING 2012  
DISCRETE MATHEMATICS FOR COMPUTER SCIENCE

Class #9 (Sets)

**Homework, due in hard copy Monday 2/13/2012 at 10:10am**

**Please write your TF's name on your homework, and list the names of any students with whom you collaborated.**

1. Prove that for any sets  $A$ ,  $B$ ,  $C$ , and  $D$ , if  $A \times B$  and  $C \times D$  are disjoint, then either  $A$  and  $C$  are disjoint or  $B$  and  $D$  are disjoint.\*
2. If  $A$  and  $B$  are finite sets such that  $|A| = m$  and  $|B| = n$ , then what are the minimum and maximum sizes of each of the following sets. (You don't have to write a formal proof for each one, but you do need to justify your work. How do you know you can attain your given minimum or maximum? Why can't each set be smaller or larger?)
  - (a)  $A \cup B$ ?
  - (b)  $A \cap B$ ?
  - (c)  $A - B$ ?
  - (d)  $\mathcal{P}(A)$ ?

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\*Credit: from Albert R. Meyer / MIT 6.042.